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November 1, 1945

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Labor Trouble in the Barnyard

APPARENTLY chickens have historically been credulous creatures, readily believing what they are told. Witness the ancient story of Henny Penny and Chicken Little. You are still young enough to remember it, I hope.

At any rate, somebody played a prank upon them. Legend says that it was a fox who when a nut fell from a tree in the henyard told Henny Penny and Chicken Little that the sky was falling.

Whether they actually believed it or not we do not know. But we do know that they lost no time in spreading the story. Indeed, so efficiently and eloquently did they spread the bad news that in no time at all the barnyard was in a turmoil. And Henny Penny and Chicken Little became suddenly very important personages. Strangely enough or perhaps, considering chicken intellect, not so strangely, they still retained their community standing even after the catastrophe failed to materialize.

Of course, you could not pull the same thing twice, even with dumb chicks such as inhabit barnyards. So Foxy Loxy, the mischief maker, had to think up a new one.

One day, toward fall, when the ground was getting frostbitten and the scratching was becoming harder, Foxy Loxy again approached Henny Penny and Chicken Little. Said he: "You folks work pretty long hours to make ends meet it seems to me. Here you are scratching away from dawn to twilight in your henyard just to make a bare living. Don't you know that the eight-hour day, five-day week is here to stay, at least to stay until we can cut it down some more? So organize and stand up for your rights, and in recognition of your leadership on past occasions, I appoint you shop stewards of the henyard."

Henny Penny and Chicken Little took their new responsibilities and the prominence they gave them quite seriously. The chicks of the henyard heard the news of the shorter work day and work week with rapt attention. "That will give us four hours more a day to sleep and otherwise enjoy ourselves," they said, "and two whole days a week to do nothing but loaf and cackle."

So the inhabitants of the henyard formed an organization known as the Chickens International Order, and appointed six big roosters to enforce the new rules. Thereafter, any hen or rooster caught scratching except between the hours of eight to four or on Saturdays and Sundays were fined six tail feathers for each offense.

The only trouble with the new arrangement was that the worms wouldn't cooperate, but stayed as far underground as ever. They did not recognize the fact that there was a new era in which the hens were to have more worms for less work.

So after a while the chickens began to lose weight. The hens especially did not mind it at first because from stylish stouts their figures were reduced to debutante or spring chicken models. But after a while they became too scrawny and began to wonder whether food was not preferable to leisure.

They asked the wise old owl in the willow tree about it but as usual his reply went over their heads. He said: "Your scale of living is determined by your productivity." They took this saying to a woodchuck who had his feet on the ground and he put it into barnyard English, to wit: "As you scratch so shall you eat."

J. H. Van Deventer



STREAMLINING THE "SWING-BACK"

In these days of transition many manufacturers are going into the production of radically new products, becoming familiar with new equipment, adapting old machines to new uses and finding out how to control processes that are different. They are in the throes of a "swing-back" from wartime operation to peacetime manufacturing.

Inland metallurgists are familiar figures in many of these plants, where for years they have been applying their expert knowledge of putting steel to work for others.

Today, Inland metallurgists are continuing that valuable work. Their technical and practical experi-

ence in the selection of steel, in latest fabrication methods, and in speeding up output, are helping manufacturers produce many kinds of newer and better products.

If you have a problem in the use of steel, call on us. A member of our metallurgical staff will be glad to call and work closely with you.

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INLAND STEEL

► Bethlehem Steel has launched a long range expansion program for its West Coast facilities with the installation of the fourth openhearth in its Los Angeles plant. Later, Bethlehem expects to spend \$200,000 on the Seattle nut and bolt plant, which should permit it to supply the needs of the entire western market.

► First shipments of the new Nash are being made. First production is limited to 4-door sedans in the low price "600" and medium price Ambassador lines. Nash estimates an annual production rate of 150,000 units by January, 250,000 by June.

► Canada's dead and missing during the war was 41,000 (exclusive of air crews in the RAF) which is 60 pct higher than the U.S. total of 294,419 when adjusted on a population basis. War expenditures totaled \$18.2 billion compared to \$280.6 billion to June for the U. S., the former being 25 pct lower when adjusted on a population basis.

► "Unikel", an antioxidant and rust preventive developed by the USSR during the war for removing rust from captured enemy materiel, is now coming into use for the protection of steel particularly for the preservation of oil well casings.

► During the height of the coal strike, WPB officials were so worried about its effect on steel production that they seriously considered the installation of the priority system as an emergency measure. The move died a-borning when the coal strike ended.

► "Empire preference" trading seems assured in the bright new world, if the opinions of British Empire industrialists now meeting in London hold sway. In their opinion the obvious benefits of the present system, promoting trade within the Empire at the possible expense of other international trade, are of primary importance.

► African consumer market possibilities are being encouraged by England, partly through the use of some of the \$480,000,000 voted to be spent in the next ten years for the development of the colonies.

Merging of the seven central African administrative units under British control into one governmental unit is also being studied for the same reason.

► First models of civil aircraft for Britain will continue to be financed by government subsidy, due to the great increase in cost of the prototypes during the war. The view is held that no operating airline or hopeful airframe manufacturer could be expected to bear the full costs and risks.

Pressure is being applied on the British Ministry of Aircraft Production to release the controls on aircraft production. Under present restrictions the ministry dictates absolutely on all production matters, just as it did throughout the war.

► Night carrier flight operations in the U. S. fleet were halted immediately upon the end of hostilities due to a very high accident rate.

The Navy will continue to ask for appropriations for a night fighter force.

► Some dissatisfaction is being felt with the new government in England due to criticism of the handling of housing construction. It is being voiced both through the Conservative party and extreme left-wingers.

► Precision casting offers two important advantages leading to castings of high hardness and strength. These are control of investment temperature and the possibility of quenching the castings under controlled conditions.

By varying investment temperature and quenching conditions, a wide range of metallurgical properties are obtainable especially in those alloys that undergo phase changes.

► Use of the fluoroscope with rotational scanning to detect flaws in light metal castings shows a surprisingly large number of medium and larger defects that cannot be seen radiographically.

This OPRD investigation also resulted in an improved protective window. By substituting a Lucite cell filled with a nearly saturated aqueous solution of lead perchlorate, the disadvantages of a lead glass window that turns brown when exposed to X rays are eliminated.



Precision - Cast Copper - Base Alloys

By S. LIPSON, H. MARKUS

and

H. ROSENTHAL

Metallurgists, Frankford Arsenal,
Ordnance Laboratory, Philadelphia

FIG. 1—Completed lead alloy mold with drilled sprue and guide pins in which wax patterns were cast.

... Data are being accumulated on the metallurgical properties of nonferrous precision castings at the Frankford Arsenal laboratory. Representative alloys from the zinc-base, aluminum-base and magnesium-base alloys, as well as the copper-base alloys, are already being studied. This report presents some of the data collected on four copper-base alloys: leaded red brass (85-5-5), leaded yellow brass (60-40), high-strength manganese bronze and silicon brass. In the first part of this two-part article, the procedures and techniques used in casting the test specimens are fully described.

SINCE nonferrous precision castings have many potential applications in ordnance equipment, the Frankford Arsenal laboratory has undertaken a metallurgical study of the properties of some representative nonferrous alloys cast by this means. The substitution, in some instances, is fairly simple, being merely the replacement of a sand casting by a precision casting for the purpose of reducing or eliminating machining operations.

In most instances, however, it is foreseen that precision casting will replace a part machined from bar stock, sheet or other wrought metal stock. The properties of the precision casting must then be equivalent to that of the wrought metal replaced. In many cases, half hard and full-hard stock is specified in order to obtain the benefit of increased hardness and strength.

To obtain equivalent properties in a copper-base precision casting such high-strength alloys would be required as yellow brass, aluminum bronze, manganese bronze and beryllium copper. From these considerations, it is evident that, for intelligent utilization of precision castings, a fund of data is necessary on the prop-

erties which may be specified for precision-cast alloys.

The process of precision casting can be divided into five phases:

- (1) Casting of wax patterns in a mold.
- (2) Fastening of one or more wax patterns into an assembly provided with wax sprues and gates.
- (3) Pouring an investment around the wax assembly which hardens into a ceramic refractory.
- (4) Melting and burning out the wax from the investment.
- (5) Casting the desired alloy into the cavity previously occupied by the wax.

Precision casting offers considerable latitude of casting conditions unobtainable with other casting techniques. One of the most important of these is the control of investment temperature. With most of the other types of casting only the extremes are available: chill conditions with die and permanent-mold casting or slow cooling with sand casting.

Another important point associated with precision casting is that the hot plaster-type investment decrepitates rapidly when plunged into water. This permits the possibility of quenching the castings under controlled conditions.

By varying the investment temperature and the quenching conditions, a wide range of metallurgical properties is obtainable. Of course, this is especially true of those alloys which undergo phase changes.

Casting Technique

There is a natural division between precision casting of nonferrous and ferrous alloys. The investments for nonferrous alloys consist of silica and plaster of paris, the latter acting as a binder. Ferrous alloys react with the plaster, thus necessitating other types of binding material. The more refractory binding materials require a relatively complex procedure during the investment stage of the process.

At its present stage of development, precision castings are restricted to small sizes and consequently involve the handling of small melts. Although this fact does not impose too formidable a barrier to the handling of nonferrous melts, small ferrous melts require special pains to prevent premature freezing. These conditions have influenced the technique by which the metal is cast into the ceramic mold. The trend for ferrous alloys is to cast with the least possible delay by methods akin to static casting with or without the addition of air pressure

RIGHT

FIG. 2—Wax injection machine showing mold in position and pressure gage.

BELOW

FIG. 3—This arrangement of wax patterns on a rubber sprue base gave unsound castings when used with the 60-40 leaded yellow brass. This design is believed to give rise to too much turbulence when the 60-40 alloy enters the mold, thus causing entrapment of surface dirt and oxides.



to help force the metal into the mold. The trend for nonferrous alloys is to use centrifugal force for injecting the metal into the mold.

The technique described in this report represents various stages of development from rather crude to more refined methods. In some instances, the changes were dictated by convenience or improvement in control. In others, the changes were required by the varying characteristics of the alloys studied.

Methods and Materials

Specimens: Because of its convenient size, the 0.252-in. diam, 1-in. gage length, threaded-end tensile specimen was adopted for this work. A lead-base alloy mold served for casting the wax patterns. The lead-base alloy mold was made by using a standard machined specimen as the primary model. This resulted in the final castings being slightly smaller than the primary model because of the shrinkage in the wax and the metal casting. However, the gage diameters of the cast specimens were measured before testing so that the tensile values were



ABOVE

FIG. 4—Tree design adopted for the 60-40 alloy.

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based on the actual cross-section.

The mold in which the wax patterns were cast was made in the split half design. First, a longitudinal half of the machined model was covered by plaster (Rapidstone, Kerr Dental Mfg. Co., Detroit). An alloy consisting of 59.2 pct lead, 13.6 pct tin and 27.2 pct bismuth was then cast against the exposed half. The plaster was removed, a parting medium of lamp black applied to the mold sur-



face, and the second half of the mold cast against this surface. The completed mold with drilled sprue and guide pins is shown in fig. 1.

Wax Injection: Wax patterns were cast by injecting molten wax into the mold cavity. A formulation consisting

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BELOW

FIG. 5—Tree design used for manganese bronze castings. The small riser-like projection collects the dross at a location which does not affect the quality of the specimens.



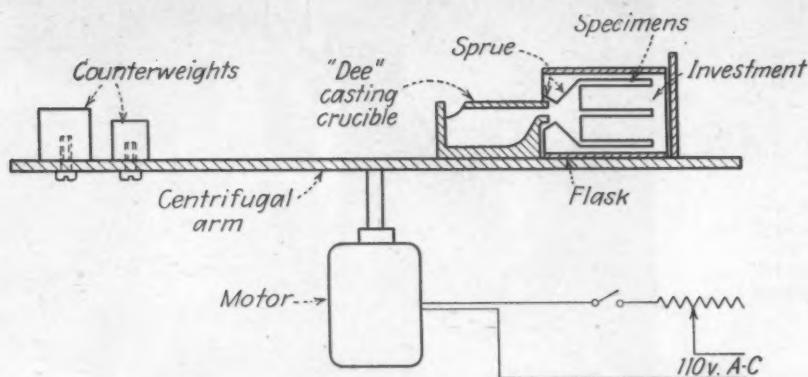


FIG. 6—Schematic representation of the centrifugal casting machine. The molten metal is poured into a crucible which is so designed as to hold the metal until the apparatus starts spinning whereupon the metal is acted upon by centrifugal force accelerating it in an outward direction and into the flask.

of equal parts of rosin, ceresin, and carnauba wax was maintained 5° F to 10° F above its melting point in the injection machine. The machine was equipped with electrical heating elements thermostatically controlled. It is shown in fig. 2 with a mold in position.

The apparatus was especially designed to inject the wax by air pressure into the bottom of the mold with a definite pressure-time cycle. In the beginning of the cycle, the wax is injected at low pressure in order to allow time for the air to be driven out of the mold, thereby preventing entrapment. The pressure then rises gradually to a full-line pressure of 90 psi and is maintained until solidification has been completed. After the pressure is relieved, the mold is removed from the machine, further cooled by an air blast, and the wax pattern removed. Patterns were inspected for defects and the patterns were then ready for the next operation of treeing.

Treeing: A convenient number of wax patterns, usually eight, were mounted into assemblies called trees. A small, pencil-type soldering iron was used to melt the wax wherever a junction was desired. Various arrangements by which the wax tensile specimen patterns were mounted on the rubber sprue base are shown in figs. 3, 4 and 5. The reasons for the changes in arrangement will be explained later.

Investment: Into the lip of the rubber sprue base is set a steel tube known as a flask. The flask is 6 in. long, 4 in. in diam, and made of low-carbon 14 gage welded tubing. The investment is then ready to be poured around the wax assembly contained by the rubber sprue base and flask.

The investment is a mixture of crystobalite acting as a refractory and gypsum acting as a binder. Certain small additions are made for controlling the setting time. This invest-

ment was also supplied by the Kerr Co.

Two parts of the investment are mixed with one part of water by weight. After thorough mixing, the creamy mixture is placed under a bell jar and the air rapidly evacuated by a vacuum pump. By this means, the air churned into the investment is eliminated. The tree is immersed in ethyl alcohol to clean the wax and to leave a thin liquid film. The vacuumed investment is now poured into the flask, and because of the alcohol dip, wets the wax without difficulty. A second vacuum treatment now removes the last traces of air still present to assure perfect contact between investment and wax, uninterrupted by clinging air bubbles. On removal from the bell jar, the flask is put aside for an hour in order to give the investment an opportunity to set.

Burn Out: As soon as the investment has set, the rubber sprue base is stripped from the flask which is placed in an oven. The oven is maintained at 180° F to 200° F. At this temperature the wax liquefies and most of it runs out of the flask although part is absorbed into the investment. At this stage, the flask is transferred to the burn-out furnace where the temperature is slowly raised to 1350° F and held at this temperature for 4 to 6 hr. The furnace is then permitted to cool with the flasks to the various temperatures being studied from 400° F to 1200° F.

The burn out accomplishes two things. First, the wax is completely removed and second, the gypsum is calcined. Both of these processes contribute toward an increase in the permeability of the investment. This permeability is necessary since no artificial vents were provided for purging the air during the casting of the metal.

Casting: A schematic representation of the casting machine is shown in fig. 6. The molten metal is poured into a crucible which is so designed as to hold the metal until the apparatus starts spinning whereupon the metal is acted upon by centrifugal force accelerating it in an outward direction and into the flask.

Both gas and induction heating methods were used for melting. The gas-fired melting and preheating furnace shown schematically in fig. 7 was used only for the 85-5-5-5 alloy and the induction heating was used for the other alloys. The metal was melted under a borax flux and its temperature measured by a chromel-alumel thermocouple protected by a silica tube.

Both the melting and casting cruci-

TABLE I
Chemical Composition of the Casting Alloys

Element	Analysis							
	85-5-5-5		60-40		Silicon Brass		Manganese Bronze	
	Comp., Pct.	Spec. (1)	Comp., Pct.	Spec. (2)	Comp., Pct.	Spec. (3)	Comp., Pct.	Spec. (4)
Cu	84.20	84-86	62.21	60-65	80.22	99.5*	60.74	60-68
Sn	4.52	4-6	0.74	0.5-1.5	<0.01*	1 max	<0.01*	0.5 max
Pb	5.06	4-6	1.16	0.75-1.5	<0.01*	1 max	<0.01*	0.2 max
Zn	8.12	4-6	Rem.	Rem.	Rem.	5-16	Rem.	Rem.
Fe	0.04	0.30 max	0.22	0.75 max	0.24	2.5 max	2.46	2-4
Ni	0.3-0.5*	1 max	0.23		0.01*		<0.01*	
Sb	0.1-0.5*		<0.02*		<0.02*		<0.01*	
As	<0.02*		<0.02*		<0.02*		<0.02*	
Mn	<0.006*		0.005*		0.03*	1.5 max	2.23	2.5-5.0
Al	<0.01*		0.3	0.5 max	0.04*	1.5 max	5.68	3-7.5
Si	<0.05*		<0.05*		4.82	2.5-5.0	<0.05*	
Bi	<0.005*		<0.005*		<0.005		<0.005*	
P		0.05 max		0.015 max				

* Spectrographic Analysis
* Plus named elements
< = less than

1 ASTM spec. B145-44T comp. 4A
2 ASTM spec. B146-44T comp. 6C
3 ASTM proposed spec. comp. 12C
4 ASTM spec. B147-44T comp. 8C

ble are of clay-graphite composition. The melting crucible has a bottom pour arrangement; the casting crucible is of a patented design (Thomas Dee & Co.).

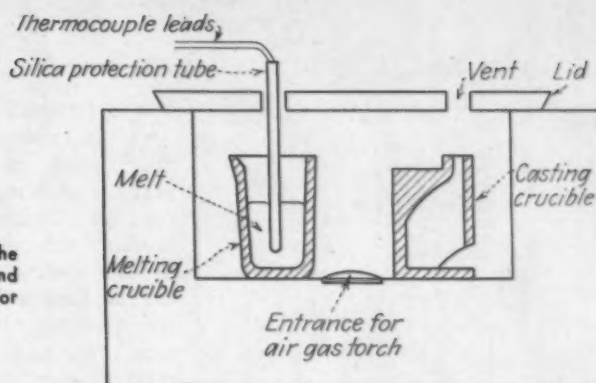
With the induction heating arrangement, the melting crucible was heated by a coil. After the metal was melted, the crucible was lifted out of the coil and placed on a fire brick. While the metal temperature was being measured, the Dee casting crucible was placed in the coil and preheated.

When the metal reached the casting temperature, the Dee crucible and the flask were removed from their respective furnaces and placed in the casting machine. The metal was then poured into the Dee crucible and the motor started. The speed was increased until a rate of 250 rpm to 350 rpm was reached and the apparatus was then allowed to spin at constant speed while the metal solidified in the flask. In about 3 min the machine came to rest. The flask was then removed from the machine and either water quenched or slow cooled as desired.

Phosphor-copper was used for deoxidizing the 85-5-5-5 alloy 5 min before casting. Approximately 0.01 pct of phosphorus was added and stirred in. No attempt was made to make additions of zinc since little flaring was encountered with the temperatures used.

Commercial ingot alloy was used

FIG. 7—Diagram of the gas-fired melting and preheating furnace used for the 85-5-5-5 alloy.



for the metal charge. An analysis of the ingots gave the results shown in table I.

Test Conditions

The test data are presented mainly in the form of graphs. Averages have been plotted for tensile strength, elongation, hardness and density. These averages cover one to three separate casts made under identical conditions.

Tensile tests were made on a hydraulic testing machine. A gage length of 1 in. was prick punched on the specimens to obtain the elongation figures. Specimens breaking outside of the gage length and those showing inclusions in the fracture were discarded from the calculations.

Unbroken tensile specimens were cut up for the density and hardness

measurement and to supply specimens for the metallographic studies.

For density determination, a specimen removed from the gage length was used. The surfaces were polished to eliminate any possible error from bubbles lodging in small crevices during the weighing in water. Values of density were corrected for 4° C.

Hardness readings were taken on a milled threaded-end of the tensile specimen. The end of the specimen selected was that closest to the sprue in the original casting arrangement.

Metallographic sections were transverse faces cut from the center of the gage length.

Ed. Note: Next week, the properties of precision-cast leaded red brass, leaded yellow brass, silicon brass and manganese bronze are discussed.

Flame-Cut Cinder Car Rack

BY using oxyacetylene shape-cutting machine, a midwestern steel plant recently saved more than 50 pct of the cost of a new piece of equipment. This plant needed a replacement for a cinder car rack, a structure 5 ft x 4 in. x 2½ in., used to hold the cinder car while it is being tipped to discharge its molten slag. The original rack had been cast. To avoid the high cost and lengthy delay that would be involved in making a pattern and mold for the single replacement, it was decided to flame-cut the part from a 5-in. thick steel slab with an Oxweld shape-cutting machine.

Since only a limited number of the racks were to be cut, a templet for guiding the cutting machine was sawed out of ¼-in. composition board instead of using the standard aluminum templet strip. This faster, cheaper method was entirely satisfactory for this application because the templet was used only a few times. Flame-cutting was sufficiently accurate so

that no machining of the part was necessary. A further saving is realized by this steel plant since it is

now unnecessary to stock these racks as replacements or wait for delivery when needed.

FIG. 1—The Oxweld CM-12 cutting machine and the completed rack. Notice that a pair of racks are made with each single cut. Gear blanks have been cut from part of the slab, using the same machine.



Steel Castings Replace Forgings

By E. B. BROMHEAD
and T. E. PIPER

*Materials Engineer and Chief Process
Engineer, Respectively,
Northrop Aircraft, Inc.*

... Generally considered unreliable from a quality standpoint, alloy steel castings are made to aircraft quality standards and prove highly efficient as structural members by virtue of their high weight-strength value.

ALTHOUGH steel castings are not in themselves new, having been used for nearly a hundred years in such applications as the railroad and transportation industry, in machine tools, and for valves and pipe fittings, their use in aircraft construction marked a radical change in design thinking. During the first world war some alloy steel castings were tried out, but the quality was so poor that they were rejected. Being convinced that the desirable qualities of alloy steel castings offered a suitable structural material for use in aircraft design if sufficiently high quality and close finishing tolerances could be obtained, Northrop Aircraft experimented extensively in the use of castings in their own aircraft designs.

The quality required as a prerequisite for aircraft use is designated by the Air Corps design handbook, such castings being known as Aircraft Quality castings. Close finishing tolerances are necessary to avoid expensive machining operations and for minimum weight on portions of castings requiring no finishing. It was considered that such castings might replace steel forgings and other high-strength alloy castings such as beryllium copper and aluminum bronze which were difficult to procure during the early days of the war.

Alloy steel castings of aircraft quality are lower in cost than steel forgings, since patterns are appreciably less expensive than forging dies, especially when only small quan-

ties of parts are involved, and the raw material itself is considerably cheaper than copper alloys such as aluminum bronze or beryllium copper. Furthermore, intricate shapes can be cast much more readily than forged, and there are no objectional directional properties such as occur in forgings. Savings can be effected in machining time since it is possible to cast to close contours approaching the finished dimensions of the part, and such castings can be easily welded to other parts fabricated from wrought steel, such as engine mounts made up of welded tubing. The high strength-weight ratio of alloy steel castings as compared with other alloys makes them lighter than corresponding castings of any other alloy having the same strength, and the elongation, reduction in area, impact, creep, and ultimate strength values are much higher than in other alloys.

The use of steel castings in aircraft structural parts is permitted by the Army Air Forces under the restrictions that such parts must be static tested unless stress analysis shows that they have a margin of safety of 900 pct. Castings having a margin of safety of 900 pct are classified as Class B castings, all others are Class A. No Class A casting can be accepted if the radiographic quality does not conform to the Army Air Forces aircraft quality castings standards, an outline of which is given below.

Defects generally causing localized stress concentration are causes for rejection unless they can be removed by finishing within tolerances, viz:

- (1) Cracks
- (2) Shrinkage cavities
- (3) Cold shuts
- (4) Misruns
- (5) Discontinuities listed as follows which are so aligned as to cause stress concentration.

- a—Gas porosity
- b—Microshrinkage
- c—Dross or oxide inclusions
- d—Sand inclusions
- e—Blow holes
- f—Segregation
- g—Mottling

With these requirements as standards Northrop obtained test lots of castings from a newly established foundry where a special casting technique was used to attain aircraft quality castings. These were required to have a maximum machining allowance of 0.125 in., and on some surfaces this was held to 0.063 in. max. A minimum draft was specified on vertical surfaces, and a specially processed type of mold was employed. The sand mix was carefully controlled to produce the finest finish as closely ap-

TABLE I

CHEMICAL COMPOSITION

Heat No.	Carbon	Manganese	Silicon	Phosphorus	Sulphur	Chromium	Molybdenum	Copper
1	0.36	0.93	0.84	0.037	0.024	...	0.25	0.63
2	0.30	0.75	0.61	0.034	0.024	1.04	0.24	...
3	0.38	0.78	0.62	0.040	0.025	...	0.23	0.64
4	0.38	0.80	0.69	0.034	0.025	1.02	0.21	...
5	0.39	0.94	0.71	0.043	0.028	...	0.23	0.75
6	0.32	0.67	0.63	0.034	0.020	0.91	0.22	...
7	0.30	0.89	0.60	0.039	0.022	...	0.26	0.64
8	0.31	0.65	0.62	0.035	0.022	1.02	0.22	...
9	0.35	0.77	0.67	0.032	0.019	0.90	0.20	...

MECHANICAL PROPERTIES

Heat No.	Ultimate Tensile Strength, Psi	Yield Tensile Strength, Psi	Elongation, Pct	Reduction of Area, Pct	1200 Ft-lb	Brinell Hardness No.
1	132,990	112,180	16.5	46.2	35.0	294
2	138,020	116,670	15.5	41.1	36.0	294
3	132,000	108,500	17.5	46.5	37.0	294
4	145,410	123,470	15.0	38.3	33.0	301
5	132,500	113,500	18.5	45.5	30.0	288
6	108,000	79,000	22.5	54.5	50.5	215
7	127,000	106,000	19.5	46.0	43.0	253
8	105,000	78,500	22.5	48.5	52.0	226
9	110,000	85,000	21.5	45.0	41.0	235

proaching a machined surface as possible.

Table I is a list of nine typical heats and shows chemical compositions and mechanical properties.

A Northrop Co. specification was prepared to control the chemical composition of castings of classes 4B3 and 4C3 of the Federal Specification QQ-S-681 for use when castings were to be welded to wrought steel parts. This restricts the composition to maximum percentages of carbon 0.25, molybdenum 0.25, copper 0.5, and nickel 0.5. With these limits placed on the alloying elements perfect welds can be made. Test castings from new patterns are subjected to a close dimensional inspection, and magnetic inspection is made in order to detect surface cracks and other imperfections. The Army Air Forces aircraft quality castings standards outlined in this article have been supplemented by Northrop's radiographic and fluoroscopic inspection procedure, the purpose of which is to provide a practical and positive method of handling the radiographic and fluoroscopic inspection of all production castings. This procedure provides (1) an approval of X ray laboratories by Northrop Aircraft, Inc., (2) that the laboratory be supplied with stress marked prints of the cast part for the determination of the required number of radiographic views to be taken and for the laboratory technique approval by Northrop, and (3) the setting up of radiographic standards for quality control. This procedure has been approved by the AAF inspection section and has become the basis for revisions to AAF radiographic standards. In connection with this inspection a standard nomenclature was established for use in identifying images of casting irregularities appearing on radiographs and on fluoroscopic screens.

Further research is still needed on casting technique and on the effects

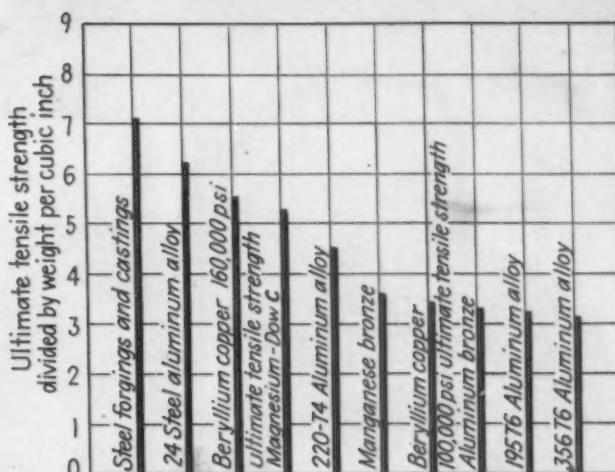
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FIG. 1 — Chart of strength-weight ratios of cast alloys and 24ST aluminum alloy (wrought) for comparison.

o o o

BELOW

FIG. 2 — Typical alloy steel castings to be used for welding to tubular members. Note the high quality of the surface finish.



of shrinkage on the internal structure of the casting in order that the designer may predict in advance the effect of size, shape, wall thickness, and dimensional requirements on the facility with which castings of aircraft quality may be made. The experience gained thus far, however, by both foundry and user, should open the way for an increased use of high-quality alloy steel castings in other industries. Weight savings will be

taken into consideration, and as foundry technique is improved with castings being made to closer tolerances, as is already possible with very small cast parts, the use of alloy steel castings will be broadened to many uses where they are not now considered practical. The quality consistency of such castings for the past year shows a scrapage of 9.07 pct, a rework of 12.23 pct, and 78.7 pct received without rework.

Invisible Ultraviolet Rays Proven Harmful

EXPERIMENTS with baby chicks reveal that exposure of eyes to invisible ultraviolet light ranging from 300 to 365 millimicrons in wave length, a range previously considered harmless by some authorities, delays dark adaption and impairs visible functions even when the eyes themselves show no obvious injury. These findings have been revealed by Dr. Ernst Wolf of the Harvard Biological Laboratories as a result of research

sponsored by American Optical Co., Southbridge, Mass.

Because human eyes could not be used in view of the potential danger, baby chicks were selected for testing, as the visual characteristics of their eyes approximate closely those of human beings, and also because chicks obligingly kept their eyes wide open during exposure to ultraviolet.

In the past it has been recognized that excessive ultraviolet encountered in welding operations, in the arctic,

or at the sea shore may damage eyes, but some authorities had assumed that if the rays below 300 millimicrons in length were excluded by filter lenses the possibility of eye injuries would be eliminated. Dr. Wolf's experiments, however, indicate that radiations below 365 millimicrons definitely impaired visual functions, and the conclusion is drawn that such rays are dangerous and should be excluded from human eyes to prevent impairment of vision.

Hidden-Arc Welding

By H. E. CABLE
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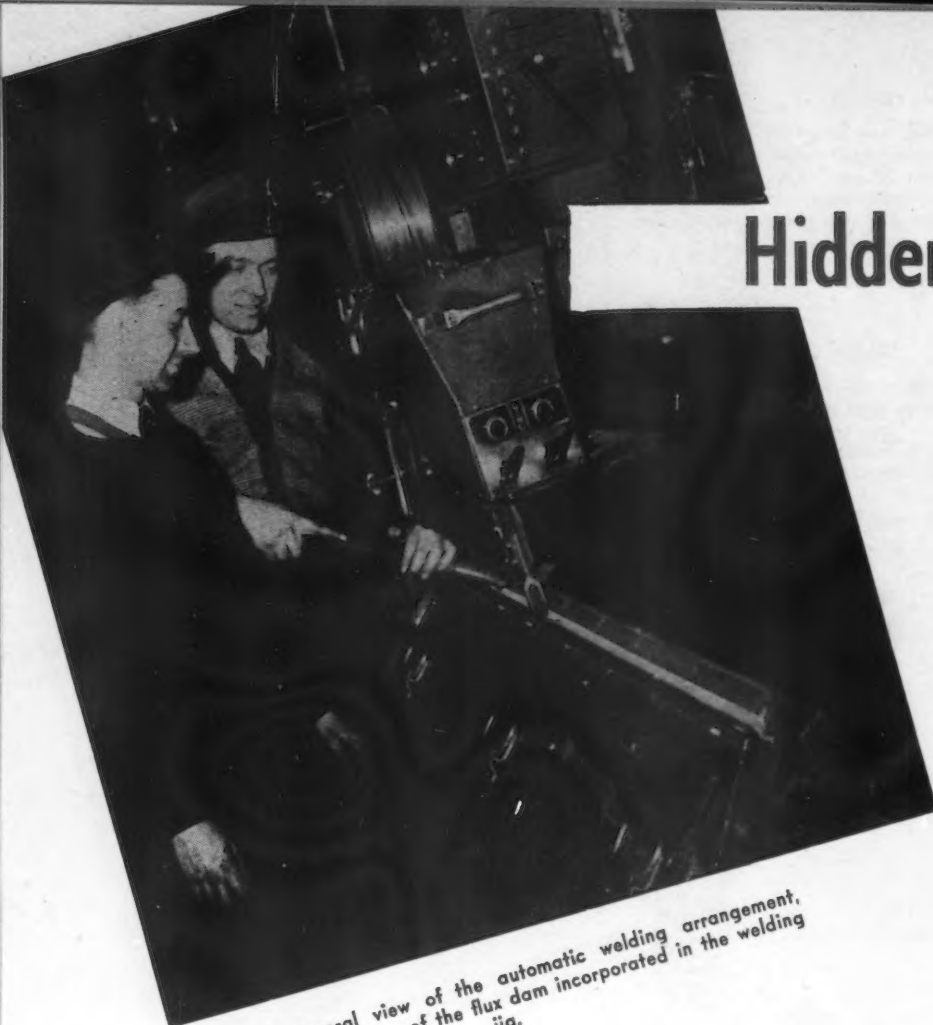


FIG. 1—General view of the automatic welding arrangement, showing the function of the flux dam incorporated in the welding jig.

ONE of the expected developments in the welding field in postwar years is the greatly extended use of automatic equipment.

One recent job in which this new welding advancement helped speed production of an urgently needed item was in the manufacture of thousands of watertight metal containers for shipping and storing bombs. The work was done by the Phillips Mine & Mill Supply Co., Pittsburgh.

This is a rather unusual box design. All seams are flanged outward at 45° to provide stiffening ribs 1-in. high. The box is made of 13-gage steel to the inside dimensions of 16 x 16 x 63 in., with a tolerance of plus 1/16 in. minus 0.0 in. on all inside dimensions, which permits practically no distortion. The top is bolted on with a mastic gasket and all corners adjacent to the top are reinforced with small gus-

set plates which are continuously welded by the manual arc.

The test which these boxes must withstand is an air pressure test with the box completely submerged and they must withstand the same water tightness test after being dropped on each corner fully loaded (500 lb load) on a steel deck plate.

Several methods of manufacture were considered, such as automatically continuously welding the edges and inside corners, or welding through one flanged rib into the other with either one or two passes, or one through

weld and one edge weld, or closely spaced spot welds and the edge weld. Since the ribs were to be spotted on the assembly jig, this last process was obviously the fastest and most economical and, upon finding this construction adequate under test, it was adopted.

The sheets were sheared, punched as required and corners notched in a second operation, and edges flanged at 45° by forming in a third. Handles were spot welded to the sides. The sides and bottom were then assembled on accurate jigs to maintain inside dimensions and the flanged edges spot welded every 2 in. The edges were then welded by the Lincolnweld process.

Since maintenance of the inside dimensions to such close tolerance was imperative, it is obvious that variations in sheets detracted from the fit-up for the automatic edge weld. In some cases edges were out of line vertically more than the thickness of one sheet. Some seams were crimped by the spot welding or were open at the edge almost the thickness of a sheet. Despite these conditions, excellent welds were generally obtained at high speed.

The sides and bottom assembly is placed on a simple jig positioned under the beam on which the welding head, control box, wire reel and flux hopper travel. The jig is designed to provide a V-shaped flux dam to retain the flux as it is deposited over the seam. This arrangement can be seen in the general view of the installation, figs. 1 and 2.

A guide wheel is supported from

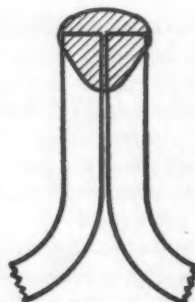


FIG. 3 — Cross-sectional view of the automatically welded joint used in the construction of the bomb box.

ing of 13-Gage Steel

RIGHT

FIG. 2—Close-up view of automatic welding unit producing edge weld on box structure. Note guide wheel supported from electrode contact shoe.



the electrode contact shoe as shown in fig. 2 which shows the welding unit in operation. The head is allowed to hinge freely within the limits around its regular hinge point so that it can follow the guide wheel along the seam. The flux is fed at the side of the electrode in order to bring the guide wheel as close as possible to the arc.

An exceptionally dense, uniform bead with ample penetration of the joint is pointed out in fig. 3 which was sketched from actual cross-sections through completed specimens.

In the original setup the 62-in. edge weld joining the side and bottom was made in 31 sec (120 in. per min) with 400 amp at 25 v at the arc. Higher speeds could be run but it was found that poor fitups had a greater tendency to cause pin holes at the higher speeds.

During the first few days of this operation, pin hole trouble developed after the flux had been run through the vacuum cleaner three or four times. The cause of this was found to be minute slivers of wood picked up through handling the flux in wooden kegs and boxes. This was immediately discontinued and the trouble alleviated, though it was not completely stopped until an additional separator tank was placed in front of the vacuum pick-up unit so that

dirt and fines were effectively separated.

Pickled but uncoiled sheets were specified and used, but shortly after starting the work a batch of sheets was received that had been oiled by mistake. In an effort to overcome resultant holes, both current and speed were increased with the result that even better seams were produced at the rate of 62-in. seam in 29 sec (128½ in. per min) with 500 amp at 25 v at the arc.

An interesting aspect of this production of bomb containers was the competition between the three shifts with the result that each shift tried to outdo the other in production. In one day the first shift welded 172 boxes, the second shift welded 186 boxes, and the third shift welded 169 boxes, or a total of 527 boxes, or 1052 seams in 24 hr. This is at the rate of a seam every 1 min and 22 sec all day long, allowing no time out. Consider that the operator and his helper had to take the box from a standing position and place it on the jig, make the

weld and pick up the excess flux, retract the flux dams and turn the box across the positioner to the other seam, replace the flux dams, weld the second seam and pick up the flux, again retract the flux dams, take the box off the fixture and stand it on end 6 ft away. This represents a splendid example of manpower performance as well as machine performance.

The welding equipment permitted the use of one grade and type of flux together with one analysis of electrode and the same procedures for a wide range of steel analyses. Thus, special joint preparations, changing of flux, wire analysis and welding procedures are eliminated, which is of tremendous importance in the use of automatic welding. Furthermore, the equipment handled ¼ in. to 7/32 in. electrode without changing drive rolls, wire contact or control, the latter being extremely simple, giving the operator quick, easy independent control over voltage, current and speed when changing from one job to another.

Fluoroscopy of

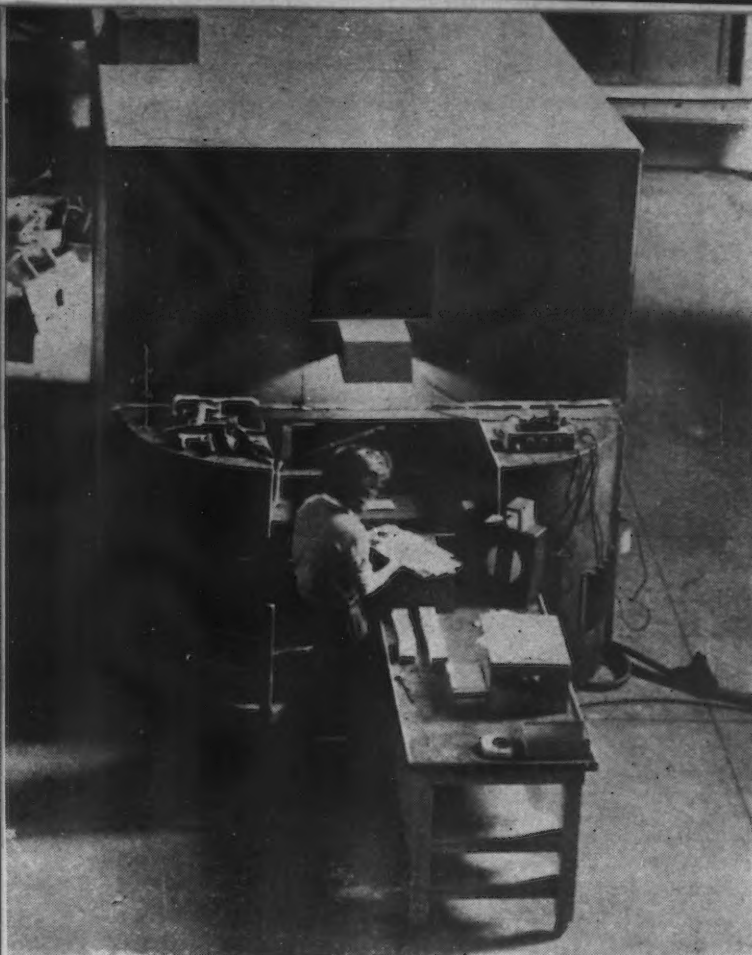


FIG. 1 — Portable fluoroscopic unit. Exterior view showing loading position and inspection room.

FOR ultimate sensitivity of flaw detection in castings it has been popularly recognized that fluoroscopy runs a poor second to radiography. Accordingly very large volumes of radiographic film, especially for the examination of light alloy aircraft castings, have been used in the last few years. The investigations here described were undertaken at California Institute of Technology for the Office of Production Research and Development of the War Production Board. The purpose of this investigation was to determine more precisely the limitations of fluoroscopy, the possibilities of improving fluoroscopy, the possibilities of substituting fluoroscopic examination for radiographic methods in certain types of inspection, and the possibilities of extending the scope of fluoroscopic inspection methods to parts which cannot be economically radiographed. It may be pointed out that these investigations have shown that some of the popular notions of fluoroscopic performance and limitations are not entirely correct.

For another article on fluoroscopy of light metals, see THE IRON AGE, issue of April 20, 1944.

When this investigation was started there were industrial fluoroscopes in use and for sale, but they were not readily available for delivery at that time. For preliminary tests a fluoroscopic unit similar to some of the commercial types was constructed using a Westinghouse 140 kvp industrial X ray unit as a basis. The conveyor and viewing arrangement was made somewhat similar to that used on a General Electric commercial model. Figs. 1 and 2 show the arrangement used. Conveyor trays on an endless chain carried specimens through a lead-lined tunnel over the X ray tube. The observer in a dark room examined the screen by looking downwards at a horizontal screen over the specimens. The conveyor trays could be moved at a speed variable from stop to 20 fpm at the operator's choice. The protective window was the customary 1-in. thick packet of lead glass, treated to reduce surface reflections. The X ray tube with a 2.4-mm focal spot was operated at a voltage of 140 kvp and with a tube current of 8 ma. In the preliminary tests the tube was placed so that the focal spot was about 20 in. from the tray bottoms.

This equipment was installed tem-

porarily in a few foundries where a large number of castings of various types were examined. The following experiences were quickly attained:

(1) All observers on all types and thicknesses of castings preferred to operate the equipment at the highest voltage available, thereby attaining highest screen brightness.

(2) It is desirable to have the viewing window adjustable so that it may be moved toward the screen to get a "closer look" at defect images from small castings.

(3) Extreme dark adaptation of the observer leads to an uncomfortable "glare effect" from unmasked areas of the field. Perfect masking is impractical except in very unusual circumstances. Better results are attained with partial dark adaptation to the illumination level of the screen. A proper level of illumination in the dark room is more comfortable than none at all.

(4) It is desirable to have only one casting in the field of view at a time. If several castings are put on a tray simultaneously, the reliability of visual scanning is reduced.

(5) Continuous motion of the screen image across the field of view reduces a tendency toward a form of eye fatigue in which the observer sees "spots." The apparent motion produced by observing a stationary image with a manually moved low power magnifying glass also reduces the tendency to see spots.

(6) On account of the large number of uncontrollable variables involved it seemed almost impossible to get any fairly reproducible and quantitative measure of fluoroscopic performance from this preliminary investigation.

After these preliminary experiences it seemed that the only way to get a quantitative statement of fluoroscopic performance was to examine a series of artificially simulated defects of known sizes under carefully controlled laboratory conditions. The artificial specimens used in these tests consisted of sandwiches of two flat blocks of

of Light-Alloy Castings ▲ ▲ ▲

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Professor of Mechanical Engineering,
Respectively, California Institute
of Technology

3-SO aluminum alloy, each block being 2½ in. long, 1½ in. wide, and ¼ in. thick. The total thickness of each specimen was ½ in., to which any desired additional thickness of aluminum sheet could be added. Artificial defects, in the form of spherical cavities, long cylindrical cavities, and flat washer-shaped cavities, were introduced at the interface between the two blocks of each sandwich, as shown in fig. 3. The spherical and long cylindrical cavities were formed by pressing spherical steel shot or segments of steel wire of known dimensions between the two blocks. The flash was filed off. The pressing and filing were repeated until only the desired cavity remained. The washer-like cavities were produced by use of an end mill. The proper alignment of the two blocks of the sandwich was assured by two brass pins in opposite corners.

The diameters of the spheres and wire, and the thicknesses of the washer-like cavities used in these specimens were: 0.063 in., 0.050 in., 0.045 in., 0.040 in., 0.035 in., 0.030 in., 0.025 in., 0.020 in., 0.015 in., 0.010 in., and 0.005 in. Four locations in the face of the block were used so that observers would not get accustomed to looking at only one position. Ten "blank" specimens were included in each run. In order for the observer to score correctly he had to report not only the nature of the defect but its position in the block (such as corner, center, edge, etc.).

Results were tabulated for each test run on a form shown in fig. 4, where the columns indicate the type and location of the defect, and each succeeding row indicates successively smaller thicknesses of defect. Correct identifications are shown on these charts as white squares, incorrect identifications as black squares, and defects unobserved as crosshatched squares. A scoring method was used in which a relative figure of merit was derived as the product of a sensitivity score and a reliability factor. The sensitivity score was determined by the percentage of the total number of defects identified correctly. The reliability factor was determined by the

... This investigation indicates that the fluoroscope using rotational scanning shows a surprisingly large number of medium and larger defects that are not detected radiographically. Also described is a superior type of protective window to take the place of the conventional lead glass window which discolors.

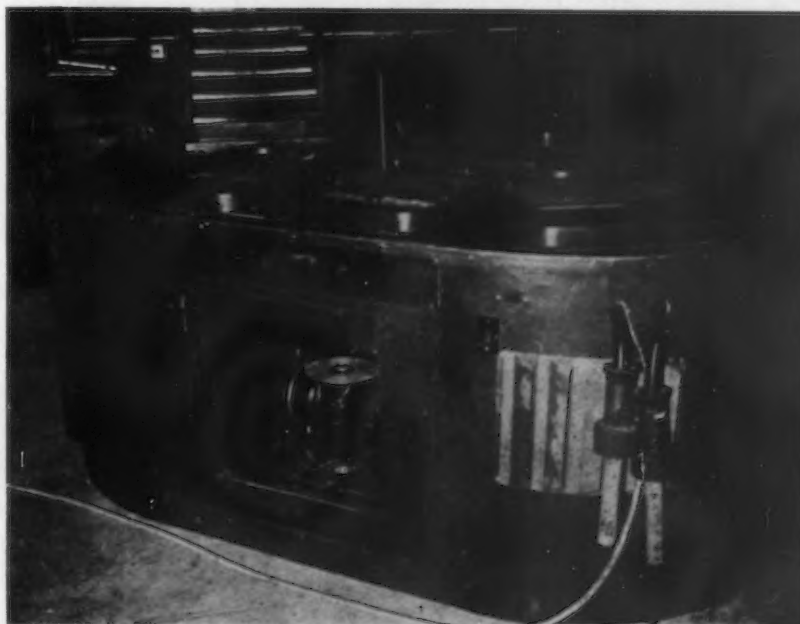
percentage of the total number of reported defects (not including blanks) which were reported correctly.

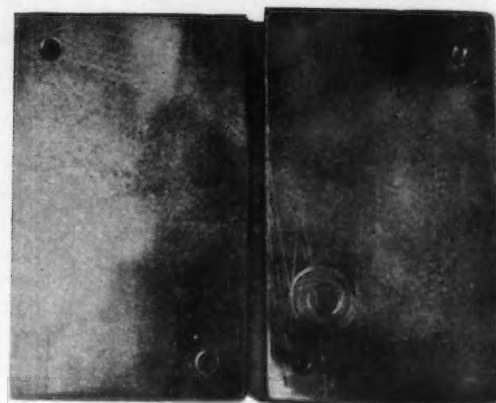
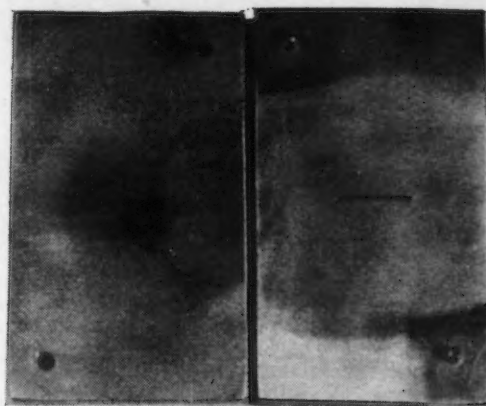
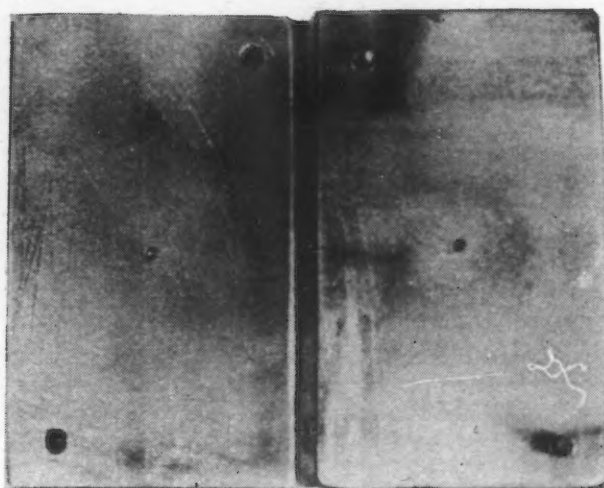
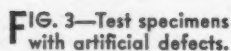
These tests were made with many observers under various controlled conditions, such as total thickness of specimen, speed of tray motion, distance of X ray tube from tray bottoms, distance of screen from specimens, etc. Most observers had no previous experience. Three or four, however, including an experienced film reader, became experienced fluoroscopic observers during the course of this investigation. The more significant findings as the result of these tests are as follows:

- (1) It is entirely improper to assign a blanket "percentage sensitivity" to fluoroscopy. The percent-

age thickness of cavity reliably detectable is a function of area of the cavity, thickness of the specimen, rate of thickness transition at the boundary and other factors not well defined. Spherical cavities are much harder to pick up than long cylindrical cavities of the same diameter. The long cylindrical cavities in turn are much harder to detect than a washer-like cavity of thickness equal to the cylindrical diameter. Drilled holes of both diameter and length equal to the diameter of a spherical cavity with which they are compared are more visible than the sphere when the axes of the drilled holes are in the direction of the X ray beam but are not more visible when the axes are

FIG. 2—Arrangement of the X ray tube head in a lead-lined box beneath the conveyor of the portable fluoroscope.





☐ Defects reported correctly
☒ Defects reported incorrectly
☐ Defects not reported

FIG. 4—Forms used for tabulation of results of observer tests.

appreciably inclined to that direction. However, very small drilled holes are not more visible than the spherical cavity even when their axes are in the direction of the beam. This is understandable if it is assumed that a sharp boundary to the image makes it more visible, but that very small images cannot have a relatively sharp boundary on account of the grain of the screen.

The percentage sensitivity becomes smaller, i.e. improved, with increased total thickness of the specimen. Up to thicknesses of 1 in. of aluminum the absolute sensitivity decreases with thickness in such a way that the percentage sensitivity improves almost, but not quite, in proportion to thickness.

(2) Despite the geometrical distortion and penumbra unsharpness due to the size of the focal spot of the tube, a spectacular increase in test score is obtained by putting the focal spot about 5 in. from the tray bottoms instead of 20 in. In these tests the screen was 3 in. above the tray bottoms so that the range of focal spot-screen distance was from 8 to 23 in. A decrease of focal spot-screen distance over the range

increases the screen brightness by a factor of

$$\left(\frac{23}{8}\right)^2 = 8.3. \text{ With increased}$$

screen brightness only slight dark adaptation is required for comfortable viewing. There is no appreciable glare effect from unmasked areas, thereby making intricate masking methods unnecessary. The effect of "seeing spots" also seems to disappear unless the observer strains his imagination to the limit or becomes appreciably fatigued. Fig. 5 shows a typical comparison of test charts for long and short distances.

(3) Under any set of viewing conditions it takes the observer as much as 1 min to determine whether or not he really sees defects near the limit of resolvability. If his time is limited his performance on these limiting defects becomes very erratic.

In order to take full advantage of the greatly increased screen brightness attained by placing the tube a short distance from the work piece, it is necessary to abandon the use of lead glass as a protective window. When lead glass is exposed to X rays of the intensity utilized in short distance fluoroscopy it rapidly turns brown. In fact under these conditions crude images of the castings are formed in the lead glass. They fade, but leave a residual coloration which is hard to remove by heating of the lead glass. Coincident with the initial field tests with the fluoroscope an attempt was made to find a substitute for the lead glass. A substitute was finally developed in the form of a plastic (Lucite) cell filled with a nearly saturated aqueous solution of lead perchlorate. Such a cell having a thickness of 3 in. of lead perchlorate solution is approximately equivalent to 1 in. of lead glass or $\frac{1}{4}$ in. of metallic lead. The appearance of one of the cells is shown in fig. 6. X rays seem to have no effect whatever on these cells. The solution and plastic have roughly the same refractive index hence there is no surface reflection between them. If the thickness of the cell is an appreciable part of the total viewing distance the foreshortening caused by the solution has the effect of an apparent magnification of a number of diameters equal to the refractive index of the solution. One of these cells was used as a viewing window during the tests with the series of artificial specimens.

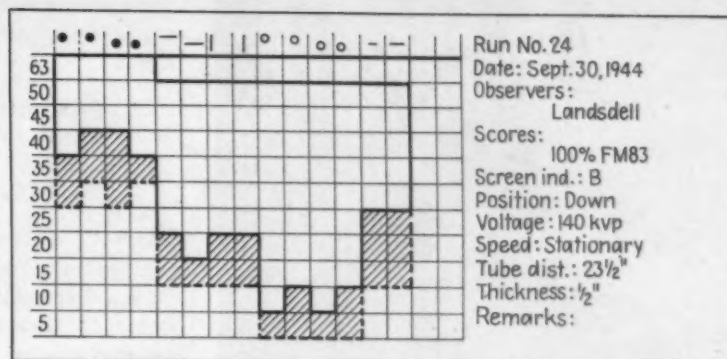


FIG. 5a—Performance chart; $\frac{1}{2}$ in. aluminum, $23\frac{1}{2}$ in. screen distance.

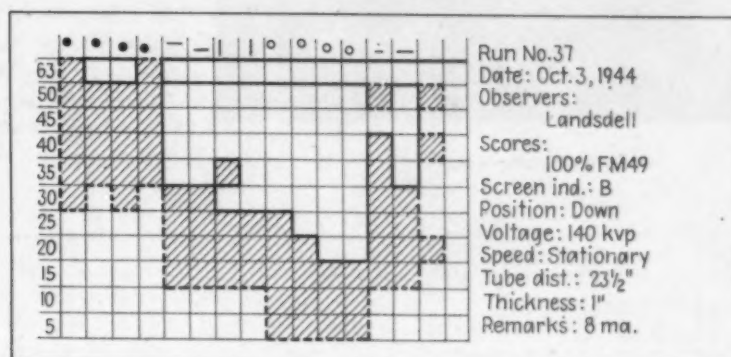


FIG. 5b—Performance chart; 1 in. aluminum, $23\frac{1}{2}$ in. screen distance.

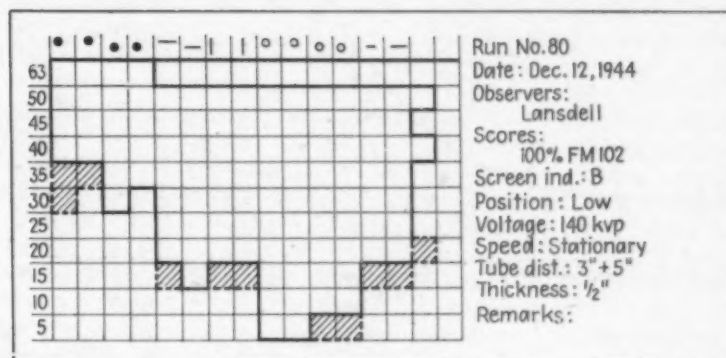


FIG. 5c—Performance chart; $\frac{1}{2}$ in. aluminum, 8 in. screen distance.

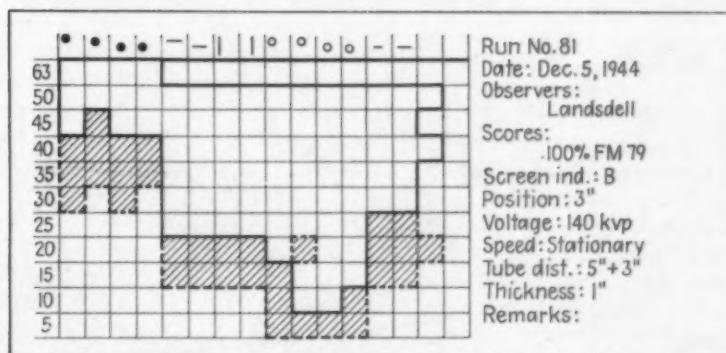


FIG. 5d—Performance chart; 1 in. aluminum, 8 in. screen distance.

The striking improvement in fluoroscopic sensitivity caused by increasing the screen brightness by a factor of about nine made it desirable to correlate this fact with an analysis of the physical and physiological factors in-

involved. It was found possible to do this in a simple way. An overall contrast factor C related to the percentage sensitivity S , e.g., determined with step wedges, by the relation $C = 1.5/S$ can be compounded as a product of

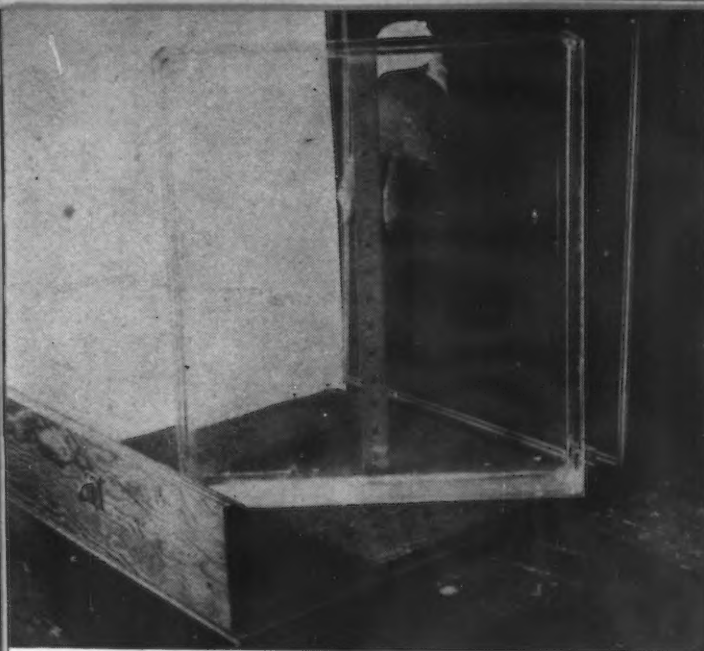


FIG. 6—Viewing cell.

three component contrast factors as follows:

$$\begin{aligned} \text{In radiography} \quad C &= C_x C_f C_e, \\ \text{in fluoroscopy} \quad C &= C_x C_s C_e, \end{aligned}$$

where C_x is the X-ray contrast factor, C_f the film contrast factor, C_s the screen contrast factor and C_e the eye contrast factor. Variations in thickness of the object being radiographed or fluoroscoped undergo several transformations before they are view-

ed by the eye as variations in brightness.

First, the variations in thickness are transformed into variations in intensity of the X ray shadow of the object. C_x describes the way in which percentage variations of X ray intensity after passing through the object vary with percentage variations of thickness. Second, the variations of X ray intensity are transformed, into variations of physical brightness of the screen in fluoroscopy or the brightness of the properly illuminated film in radiography. Usually the screen brightness is directly proportional to incident X ray intensity so that $C_s = 1$. C_f is equal to the gamma of the film at the density level used. The third stage in either radiography or fluoroscopy consists of transforming brightness variations of either the illuminated film or the fluorescent screen into variations of brightness sensation in the eye. This transformation is determined by the ability of the eye to recognize variations of brightness at the brightness level at which the screen or film is viewed. If the brightness level is higher than about 15 millilamberts all the physical contrast is actually seen by the eye, and $C_e = 1$. This is the case for a well illuminated radiographic film. At lower brightness levels the eye does not see as well. Its lowered brightness discrimination capacity can be described by C_e being less than 1. Fig. 7 shows how C_e varies with brightness. This curve is obtained from the well known brightness discrimination curve.¹

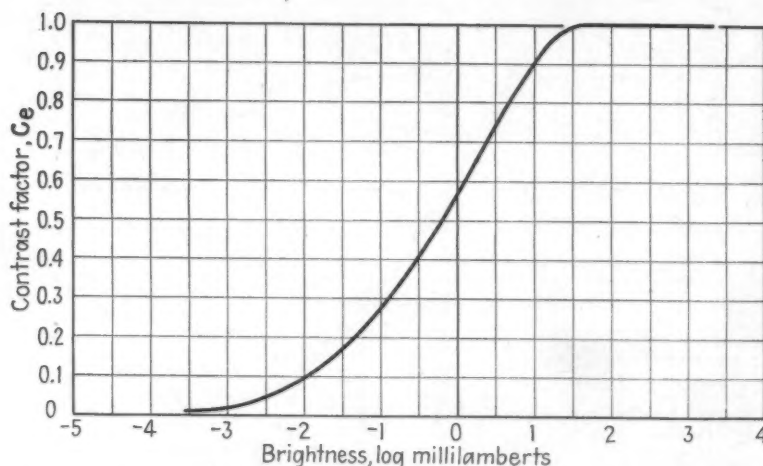


FIG. 7—Eye contrast curve; approximate values of C_e as dependent on brightness.

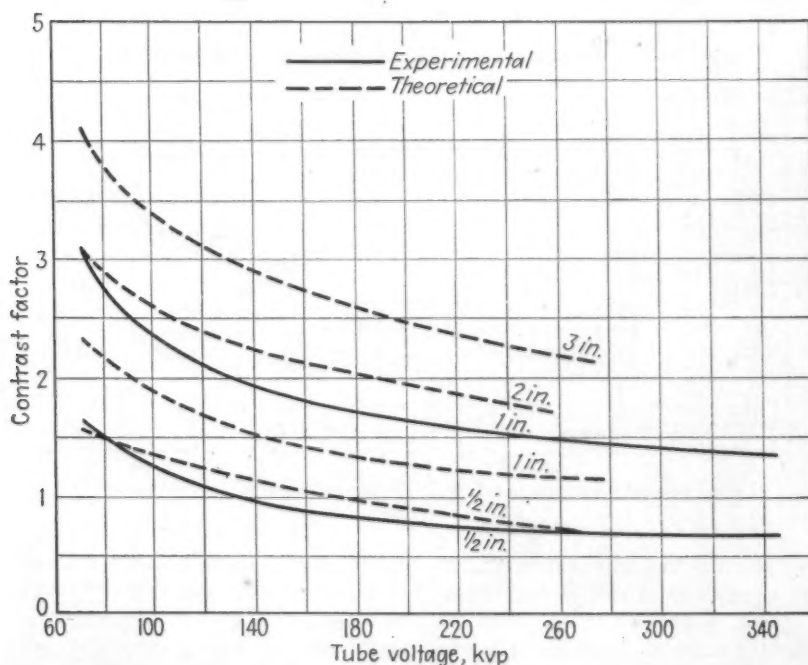


FIG. 8—X ray contrast curves.

¹Mies, "The Theory of the Photographic Process," MacMillan Co., p. 804.

Fig. 8 shows some experimental and theoretical values of C_x for aluminum. C_x increases with thickness. For a thickness of $\frac{1}{2}$ in. of aluminum it is a little more than 1 for the voltage range used in radiography and fluoroscopy. In radiography the overall contrast attainable using film of gamma equal to 5 is therefore:

$$\begin{aligned} C &= C_x C_f C_e = 1 \times 5 \times 1 = 5 \\ \text{or } S &= 0.3 \text{ pct} \end{aligned}$$

In ordinary industrial fluoroscopy such as in the field tests with the tube at 20 in. C_e will be in the range from 0.1 to 0.2, thus $C = C_x C_s C_e = 1 \times 1 \times 0.1$ to $0.2 = 0.1$ to 0.2 , and thus S will be in the range from 15 to 7 pct. In fluoroscopy under optimum conditions with a short tube distance yielding higher screen brightness C_e will be greater than 0.5, thus making $C > 1 \times 1 \times 0.5 > 0.5$ and S less than 3 pct.

These sensitivities calculated for a total thickness of aluminum of $\frac{1}{2}$ in.

are sensitivities for brightness discrimination between large areas with sharp boundaries and where no glare effects exist. It is seen that the steepness of the C_e curve in the range of brightness attainable fluoroscopically is responsible for the large increase in observable contrast obtained by moving the focal spot of the X ray tube from a distance of 23 in. from the screen to a distance of 8 in. It is also seen that even at best fluoroscopy cannot compete with radiography when ultimate contrast is required. This is because the X ray film is a contrast amplifier while the fluoroscopic screen is not.

The C_e curve shows that doubling the physical brightness, say by doubling the X ray tube current, only gives a slight gain in the eye contrast factor even where the curve is steepest. This fact has been verified by using the artificial test specimens with a commercial fluoroscope that could be operated at a maximum tube current of 15 ma. There was very little difference in performance at 8 ma and 15 ma. Therefore it would seem that no appreciable advantage can be obtained by use of the much more costly X ray equipment needed for operation at a tube voltage of 160 kvp and a tube current of 15 ma. To get enough increase in brightness by raising the tube current is impractical on account of the large increase in power and the corresponding amount of heat to be dissipated at the target. Furthermore with the higher tube current the focal spot must be made larger. The short tube distance and higher voltage seems to be the only available method of increasing the screen brightness with screens available at the present time. The possibilities of using equipment at a voltage greater than about 150 kvp have not been explored. The evidence seems to be that above a voltage of 150 kvp the screen brightness of a Patterson B or B industrial screen does not increase very much when used with thin aluminum sections, but an appreciable gain is obtained with thicker sections due to the increased penetration of the thicker parts. The possibility of sensitizing screens for greater efficiency at higher voltages would appear to offer a means of improvement, but this has not been investigated.

The short distance tube arrangement has two disadvantages along with another big advantage other than the production of higher brightness. The first disadvantage is the smaller field of view as limited by the portal system of the tube. The decrease in field diameter prohibits the use of tray-focal spot distances of much less than 5 in. except in special

cases as in the examination of very small castings. With the tray-focal spot distance equal to 5 in. and the screen 3 in. above the tray bottoms the diameter of the field on the screen is about 7 in. with one side cut off slightly by the target shadow. A large proportion of aircraft castings require a greater object-screen distance in order to enable the object to clear the screen. The greater screen distance gives a bigger apparent field of view on the screen. It is desirable to use the screen at the closest position that the castings safely clear.

The second disadvantage is the noticeable fuzziness of the shadows of defects not close to the screen. This fuzziness is due to the size of the focal spot and would become much worse with a spot larger than the 2.4 mm used in the tests discussed. Frequently, it is worthwhile to turn the castings over for a second view. However, the fuzziness does not seem to affect adversely the ability of the observer to see the presence of a defect, but only interferes with the observation of the details at the boundaries. This makes it difficult for the observer to judge whether a cavity is a gas hole or dross pocket.

A particularly significant advantage is derived from the use of a short focal spot-object distance. A small relative motion of the casting with respect to the focal spot of the tube causes a large rotational distortion effect on the shadow of the casting on the screen. The geometrical distortion does not seem to bother the observer in any way, but the rotational effect enables the observer to see many defects that would be missed in a single view. Defects hidden by ribs, lugs, and other heavier sections are made visible on the screen by the apparent change in position or rotation of the

casting. The motion of the trays relative to the tube produces the rotational scanning in one direction. A rotational scanning in the direction at right angles to the tray motion is obtained by mounting the X ray tube on a rack as shown in fig. 9, so that it can be moved 6 in. by means of a handle accessible to the observer. This motion has been of the greatest aid in picking up defects. Tests have shown that in all but the simplest castings an appreciable proportion of good sized defects can be detected by this method which would otherwise have been overlooked on radiographs involving even several views.

The most recent phase of this investigation consisted of installing the improved fluoroscope at three X ray laboratories where a large selection of castings was available and where comparisons between fluoroscopic and radiographic findings could be conveniently made. The main trend of the results of examining approximately 10,000 castings with over 14,000 defects confirms the previously mentioned considerations.

(1) The fluoroscope does not show very large numbers of very small defects that can be seen on the radiographs.

(2) The fluoroscope using rotational scanning shows a surprisingly large number of medium and larger defects that are not detected radiographically. It is seen that the utility of fluoroscopy depends on other considerations as to where to draw the line between rejectable and acceptable defects. While the specific limitations of fluoroscopy have not been established it is clearer as to the general range of limits, which may be expected. It is hoped that continued work may assist in establishing these limits.

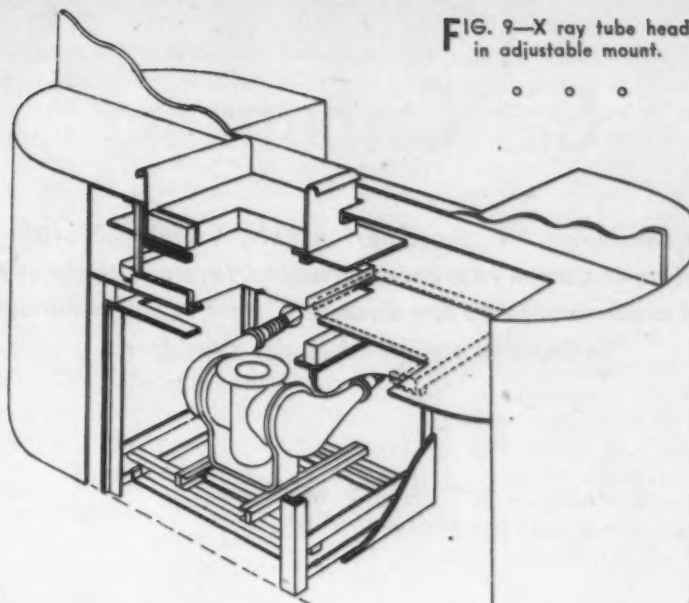


FIG. 9—X ray tube head in adjustable mount.

Gas Carburizing

... In concluding this three-part article, bright carburizing, the restoration of carbon to a decarburized surface and the heat treatment of carburized parts are discussed. How to select correct gas carburizing equipment is also considered.

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GAS carburizing has been developed to the point that parts can be gas carburized and cooled ready for reheat hardening operations having the surface absolutely free from scale, decarburization and soot deposits. Soot is very difficult to remove but it must be removed if any plating is to be done.³⁸

Conradi reports that by regulating the amount of gas used during the carburizing cycle and introducing city gas into the cooling unit immediately after the basket of carburized parts had been placed in there to cool, the parts were obtained as bright as a new silver dollar. Thorough cleaning of all parts by vapor degreasing is necessary before loading into the carburizing unit.³⁹

A commercially prepared carburizing atmosphere called RX gas is also used in bright carburizing. This gas is specially prepared in a cracking unit so that it contains no moisture or

carbon dioxide.³⁸ Therefore the amount of hydrocarbon necessary for efficient carburization is held to a minimum, and the carburized work comes from the furnace absolutely clean. The carbon content of the case is controllable at will to any desired value and the life of the alloy used for supports and fixtures is greatly extended.³⁹

The Lithium Co. sets forth claims regarding the use of lithium vapor in bright carburizing. The lithium vapor dissociates the water vapor in the carburizing gas and combines with the oxygen formed thus neutralizing any decarburizing effect. As a result, lean air-gas mixtures can be used and it is claimed that the parts come from the furnace bright and clean.⁴⁰

Skin Recovery

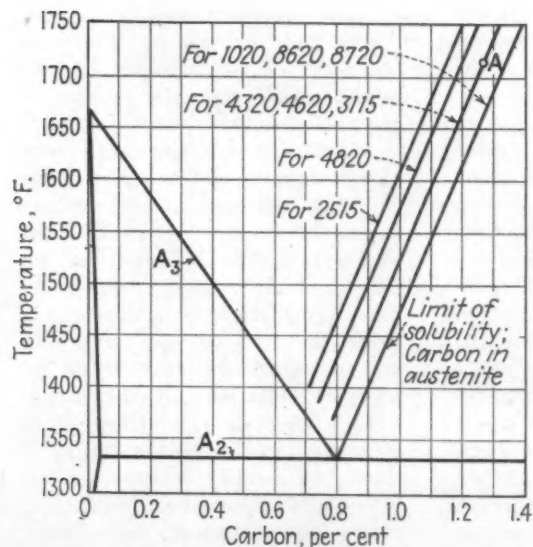
Cullen⁸ reports a skin recovery process whereby carbon is restored to a decarburized surface. Whereas carburizing depends upon a definite car-

bon gradient (high at the surface and low in the core), the skin recovery method seeks to eliminate an already established inverse carbon gradient. Its success is predicated upon setting up an exact equilibrium between the atmosphere and the carbon content of the steel prior to decarburization.

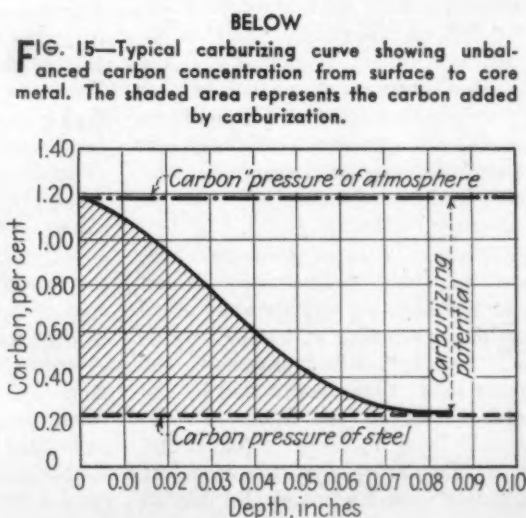
Figs. 15 and 16 illustrate the fundamental differences between carburizing and skin recovery. The shaded areas represent the carbon added by the two treatments.

In carburizing, depth of penetration is a function of time and temperature. In skin recovery, carbon penetration at any particular point ceases when equilibrium is reached between atmosphere and steel, and thereafter time has no effect. In other words, the treatment can be long enough to take care of the deepest decarburization without danger of increasing or decreasing the carbon content of those surfaces which were free from decarburization at the start of the treatment.

In the case reported by Cullen,⁸ the skin-recovery atmosphere was prepared in a gas generating unit using externally heated reaction tubes which contain a catalytic material. A mixture of air and hydrocarbon gases heated in the presence of the catalyst are quickly and completely reformed to supply an atmosphere in which carbon dioxide and water vapor (both adversely affect the skin-recovery process) as well as residual methane can



LEFT
FIG. 14 — Equilibrium diagram of various alloy steels.



BELOW
FIG. 15 — Typical carburizing curve showing unbalanced carbon concentration from surface to core metal. The shaded area represents the carbon added by carburization.

be controlled to any desired degree. This is most important, since the available carbon in the furnace atmosphere is in turn controlled by the amounts of these constituents. The generator can be set to produce the gaseous mixture required for any particular carbon in the steel and will automatically maintain this mixture and carbon pressure balance until changed by the operator. The generator supplies all the atmospheric requirements of the heating chamber. When change in carbon pressure is necessary, the operator makes the change by simply resetting the air-gas ratio control on the gas-making unit.

Fig. 17 illustrates the difference in hardness between a decarburized SAE 4140 steel forging and the same forging after skin recovery treatment. Carbon recovery was complete and within ± 0.03 pct of the original carbon in the steel.

The skin-recovery treatment is adaptable for use with either batch type or continuous furnaces. The chief requirement is that the work be heated in a chamber suitable for complete exclusion of both air and flue gas. Modern carburizing and clean hardening furnaces are admirably adapted to this use.⁴

Heat Treating Carburized Parts

The carburizing process produces a composite steel, with a high-carbon case and low-carbon core. The prolonged heating at the carburizing temperature tends to coarsen the grain size of both the case and the core, unless an inherently fine-grained steel has been used.

To obtain the optimum properties of a hard case and a soft, tough core, the heat treatment should not only harden the case, but should also refine the case and the core.

If a steel, produced to specifications to render it fine-grained, is carburized, it is feasible to quench in oil or water directly from the carburizing temperature. Steels SAE 4615, 4120, 6115 and 3115 are frequently treated in this manner. This method is used whenever possible due to its economy and saving in time.

Another hardening method used is to allow the steel to cool slowly to room temperature and then reheat to and quench from the hardening temperature of the case. This treatment, however, does not refine the core and a considerable amount of free ferrite will be present in the core, lowering its toughness.

The double treatment method is designed to produce the most desirable properties. The steel is cooled slowly from the carburizing temperature,

then reheated to above the A_c temperature of the core and cooled at a moderate rate as by an oil quench. This refines the core and prevents formation of any carbide network in the case. The steel is next heated to the hardening temperature of the case and water-quenched.

Whatever the treatment adopted, the final quench is generally followed by a low-temperature heating for stress relief. By not exceeding 350°F , the toughness of the case can be increased without affecting the hardness.^{41, 11}

Equipment

GENERAL: The equipment for gas carburizing varies according to the work to be done. It must have a chamber from which air is excluded and to which the carburizing gas is admitted. It must have means of supporting the work, controlling temperature and gas composition, and insuring even distribution of the gas to the work.

Most gas-carburizing units use some type of muffle for the chamber and heat it externally by gas or electricity. The muffle is sometimes made cylindrical. The work is usually charged into the muffle and the carburizing gas passed through; uniform contact of work and gas secured by rotating the converter.

Other batch furnaces have a vertical cylindrical retort containing a wire basket into which small parts are charged, or shelves on which longer parts are placed, and the gas is circulated by a fan.

In continuous and horizontal batch furnaces the work is loaded on fixtures in trays so that no two parts touch each other and the trays are pushed through a horizontal muffle.⁴²

PIT-TYPE FURNACE: The pit-type furnace was one of the earliest methods for gas carburizing to be developed. It consisted of a round shell, usually sunk below the floor level and equipped on the interior walls with

electric heating units. The work to be carburized was placed in racks, on fixtures, or in perforated baskets, some holding 800 lb to 1000 lb of work and these placed in a retort of chromium-nickel heat resisting alloy. After the retort was loaded, it was lowered into the furnace shell and sealed with a cover.

On the cover was a large drip lubricator which contained the carburizing oil (turpentine, linseed oil, bone oil and nitrobenzene with kerosene have all been used). The oil was allowed to drip slowly into the retort where it vaporized. The fan then distributed the vapor throughout the work and the decomposition of the hydrocarbon produced the carburizing gases.

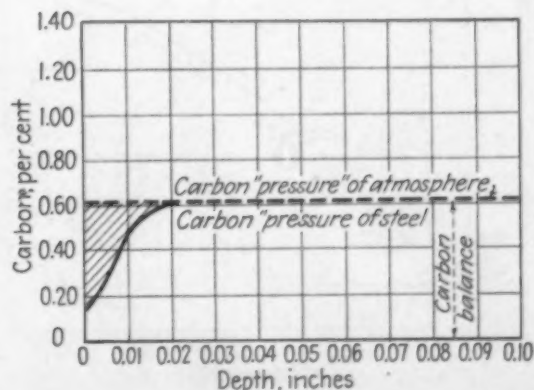
The largest item of cost is the retort, which has an estimated life of about 6000 hr and costs approximately \$1000. When a retort cracks and allows air to enter, it generally ruins the entire contents due to scaling.⁴³

A modern pit-type furnace is in use which employs the radiant tube heating principle (to be described later) instead of electricity, and which uses gas for carburizing instead of oil.

ROTATING HORIZONTAL RETORT: A rotating horizontal carburizing retort can be used for small pieces that will not be injured when tumbled. The retort has spiral ribs on its inner surface for advancing the work through the furnace, and longitudinal ribs for continually turning the parts over and changing their relative positions while in transit through the heating and carburizing zones.⁴⁴ The retort slowly revolves on rollers and is heated externally with gas.⁴⁵ The carburizing gas enters at the center of the discharge end of the retort, travels through the retort counter current to the work, and is vented through the top of the charging hopper.⁴⁶

VERTICAL RETORT FURNACE: These furnaces are designed for carburizing steel parts which are loaded

FIG. 16—Typical skin recovery curve showing balanced carbon concentration from surface to core metal. The shaded area represents the carbon added by this treatment. Skin recovery seeks to eliminate an already established inverse carbon gradient. Its success is predicated upon setting up an exact equilibrium between the atmosphere and the carbon content of the steel prior to decarburization.



in baskets, trays or on fixtures. McQuaid²¹ describes a vertical retort furnace which has electric resistors inside the vertical retort, radiating directly to the work. Straight natural gas is led in and allowed to crack for 3 min, then the gas supply is cut off for a 27-min diffusion period and the process repeated. By this technique, short circuiting of the resistors by too thick a coating of soot is avoided.

CONTINUOUS GAS CARBURIZING FURNACE: Thomas describes a continuous gas-carburizing furnace, which consists essentially of a long refractory-lined steel shell which is both over and under fired. An alloy muffle, composed of flanged and bolted sections, runs through this furnace, the carburizing trays being pushed through the muffle on two sets of rollers and skids.

Carburizing gas is introduced at several points along the top of the muffle and at the charging end and the amount introduced at each point of entry depending upon the character of the case desired. At both ends of the furnace, large, air-operated valves effectively seal the muffle. Extensions of the muffle beyond these valves form two external chambers closed at their outer ends by lifting doors. The chamber at the discharge end is used to produce any desired temperature of the work prior to quenching and provide a short diffusion period.⁴

Cowan¹⁰ found that when new trays (35 pct Ni, 15 pct Cr) were introduced into the furnace, the case depth of the work dropped. The trays could not be used until they had been thoroughly carburized, or "conditioned," after which they no longer had any effect. A tray composed of 28 pct Cr and 8 pct Ni was found to be satis-

factory for use without any previous conditioning.

The continuous gas carburizer of today retains the simplicity of the early installation in that the work is moved progressively through a chamber filled with gas so that during the course of its travel each successive piece receives an identical treatment in a carburizing gas of uniform composition. The use of specially prepared carburizing gases, such as CG and RX, has eliminated the difficulties resulting from soot and tar formation on the work surface. Development of the radiant tube heating element has greatly increased the control which can be exercised over the process, and has also overcome the difficulties associated with the casting of large metal muffle sections.

Because of the simplicity and uniformity of this operation, it has frequently been combined with other operations in a continuous cycle, so that the work in process is carburized, quenched and reheated for tempering in a continuous series of operations. Equipment is fully automatic and arranged so that the trays and fixtures which support the work in its travel are returned to the charging end of the furnace. In many installations the man who charges the work also unloads it at the same end at the completion of operations.²¹

It is now possible to carburize a variety of different parts, requiring cases of different depths, simultaneously. This has been made possible by the development of a multiple-row furnace, so arranged that the pushing time of each row can be adjusted to produce any desired case depth. In this way, each of the rows may be operating together or independently of each other.²¹

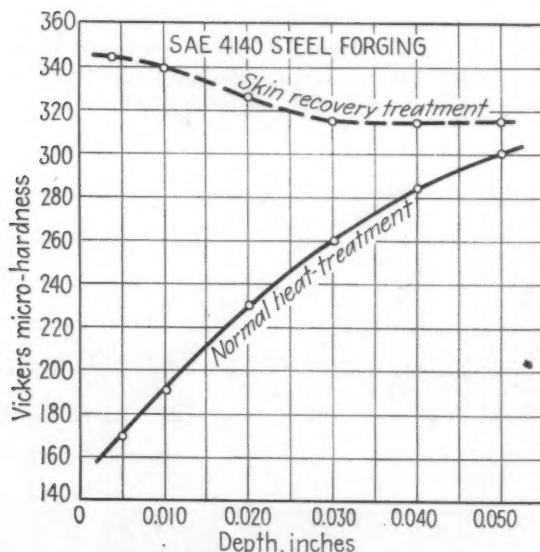


FIG. 17—These curves showing hardness v. depth before and after skin recovery illustrate the difference in hardness between a decarburized SAE 4140 steel forging and the same forging after skin recovery treatment. Carbon recovery was complete and within ± 0.03 pct of the original carbon in the steel.

RADIANT TUBES: A relatively recent development in gas firing made it possible to use controlled atmosphere in gas-heated furnaces without requiring muffles. This is the radiant tube, a device in which gas is burned inside a heat-resistant alloy tube, the walls of which radiate heat, while the products of combustion pass on through the tube without entering the furnace itself. The radiant tubes, strung along the furnace walls, suspended in the roof, or lying in the hearth, behave quite the same as though they were huge electric resistors. In order to prevent products of combustion leaking out of cracks or pin holes in the alloy tube, the products of combustion are exhausted from the tube by air-induced draft, by fan or by an air aspirator, and the tube operates slightly below atmospheric pressure.²¹

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Extruded Magnesium for Safety Blocks

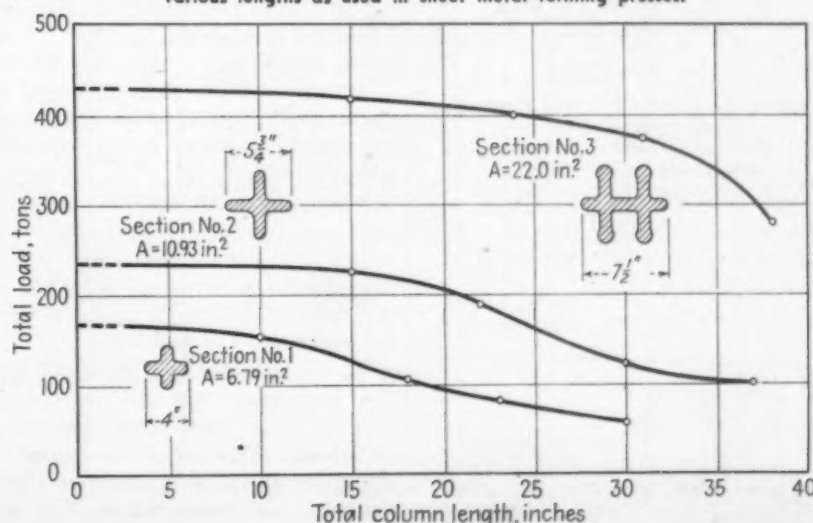
SAFETY blocks have long been used as an additional safety precaution in the die openings of sheet metal form presses while men are working on the dies. Oak blocks in the sizes commonly used are not strong enough to withstand the loads in medium and large-size presses, should the press be accidentally tripped. Steel is another material that has been used but the weight and the size either of steel or oak blocks have made them difficult to handle and tended to discourage their use by workmen even when they are made available at the presses.

Safety engineers of a large automobile plant in search for better material from which safety blocks could be made, have developed with the cooperation of the Dowmetal Chemical Co., Midland, Mich., a cast Dowmetal block which is considerably stronger than oak and much lighter and easier to handle than either oak or steel. However, a more extensive application of these cast Dowmetal safety blocks was hampered by their expense, a fact which was attributable to the large number of patterns necessary to meet various requirements in size and length.

To meet the situation and lower costs through standardization, the Dowmetal Co. has recently developed and tested three sizes (or types of sections) of extruded blocks which will meet most requirements. The three sections available in various lengths from present die equipment cover a wide range of loads. They

are shown in the figure together with the curves based on actual results obtained by testing various lengths of each size block in compression. The indicated load in tons represents the ultimate load for specific lengths. A safety factor should be allowed when considering the application of these sections.

TEST curves showing ultimate strength of extruded Dowmetal safety block sections for various lengths as used in sheet metal forming presses.



Aging Of 75S Aluminum Alloy

... Various aging treatments on 75S alloy, and their effects on the workability of the metal are described herein. Descriptions are given of the dimpling capacity, tensile properties, corrosion resistance and effects of cold working after quenching and before aging.

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Research Laboratories*

AN aircraft alloy having a higher tensile strength than any previously commercially available aluminum alloy was introduced by the Aluminum Co. of America in 1944. The alloy, known as 75S, contains approximately 5.75 pct Zn, 2.50 Mg, 1.6 Cu, with small amounts of manganese, chromium and titanium. It is commercially available in the form of sheet, Alclad sheet and extruded shapes. With certain limitations it is also available in the form of plate, rolled rod, bar and tubing.

For other articles on high-tensile aluminum alloys, see THE IRON AGE, issues of April 6, 1944, and Oct. 4, 1945.

Products of 75S are always used in the fully heat-treated (—T) temper. This temper is produced by a solution heat treatment in the range 860°F to 930°F followed by quenching in cold water and artificially aging. Table I gives the typical mechanical properties of commercial 75S sheet products and extruded shapes together with those of similar products of 24S, the most commonly used aircraft alloy prior to the introduction of 75S.

If the material is permitted to stand at room temperature after quenching, spontaneous age hardening occurs. During the first 2 hr very little hardening occurs, but after that time the age hardening proceeds rapidly until the tensile strength approaches that of the artificially aged material. Typical room temperature aging curves for Alclad 75S and Alclad 24S are shown in fig. 1. At room temperature, the alloy in the —W temper slowly ages for a year or more as contrasted with 24S which reaches its maximum strengths within about four days.

The aging of 75S at room temperature can be delayed by holding the material at low temperatures. Fig. 1 also shows the aging of Alclad 75S at 0°F and 32°F. This behavior is similar to that of 17S and 24S.

As would be inferred from the tensile properties, 75S can be formed readily immediately after quenching or several days after quenching if the material has been stored at a sufficiently low temperature, for ex-

ample 0°F. In fact, the formability almost equals that of the annealed material. As room temperature aging proceeds, the formability decreases and in about a month closely approaches that of the artificially aged material.

When the material was first introduced, the artificial aging practice generally recommended was a constant temperature treatment of 24 hr at 250°F, although occasionally a treatment of 12 hr at 275°F was used in order to shorten the aging cycle. The latter treatment, however, produced somewhat lower strengths. Typical results from these two treatments are shown in fig. 2.

As will be noted from these curves, the period of room-temperature aging prior to any artificial aging treatment, affected somewhat the final strength of the 75S-T. The highest properties were obtained by artificially aging immediately after quenching or after a period of several days. The minimum values were obtained by artificially aging in the interval between 2 hr and 2 days after quenching. Consequently, the recommendation was made that the aging should be started either within the first 2 hr after quenching or after at least 2 days of room-temperature aging. Since that time, it has been found that in commercial production other factors minimize the effect of the room-temperature aging period. Consequently, this recommendation is no longer made.

Although constant temperature aging for 24 hr at 250°F produced satisfactory tensile properties and resistance to corrosion, the dimpling capacity of the fully-aged sheet was inadequate for the standard dimpling tools then in use. Early in the development a slight improvement in the formability of the material was occasionally observed in bending tests of specimens which had been aged at two or more temperatures with the final temperature of 315°F or above. Consequently, a number of these aging practices were investigated, and some of them were found to improve substantially the dimpling capacity of 75S sheet products. Some of these treatments also require considerably less time than the previously recommended treatment.

In the interrupted aging treatments, the material is aged at a plurality of elevated temperature steps with cooling to room temperature after each aging step. Several commercially feasible interrupted treatments have been developed which pro-

duce the desired mechanical properties and improved dimpling capacity. The simplest treatment consists in aging within the temperature range of about 200°F to 225°F for 2 hr to 8 hr, cooling to room temperature and finally aging within the range 300°F to 335°F for about 2 hr to 8 hr. The specific interrupted treatment which is most frequently used consists in aging for 4 hr at 210°F, cooling to room temperature and then aging for 8 hr at 315°F. The aging is most conveniently carried out by using two furnaces, one at 210°F and the other at 315°F. The rate at which the material is cooled to room temperature from the first step has not been found to have any significant effect on the final properties. Likewise, the length of the interval at room temperature between the two elevated temperature steps does not affect the final properties.

In progressive aging treatments the material is aged at progressively higher temperatures without being permitted to cool at any time during the aging cycle. An example of the progressive treatment is the aging of 75S for 4 hr at each of the following temperatures: 200°F, 250°F and 315°F. The results obtained by the interrupted and progressive procedures are so nearly the same that a description will be given of those obtained by the interrupted procedure only.

Dimpling Capacity: The dimpling capacity of sheet aged by the different procedures was determined by making dimples for different size rivets with 100° countersunk heads (Type AN-426). The dimpling tools were modified versions of those described in the National Advisory Committee on Aeronautics' Restricted Technical Note No. 854. Mutton tallow was used as a lubricant on the dimpling tools and the sheet.

The radiographs were made using a fine-grained high-contrast film, a film to focal spot distance of 48 in., a low kilovoltage (depending upon the thickness of the sheet), and an exposure time long enough to obtain a film density of about two. The radiograph of every dimple was examined at a magnification of approximately 7 diameters.

The dimpling tests made as just described showed that 75S sheet had a substantially greater dimpling capacity when aged by an interrupted procedure finishing at about 315°F than when aged at a constant temperature of 250°F for 24 hr. For example, in a series of comparable tests there were from 50 pct to 100 pct of cracked dimples in sheet aged 24 hr

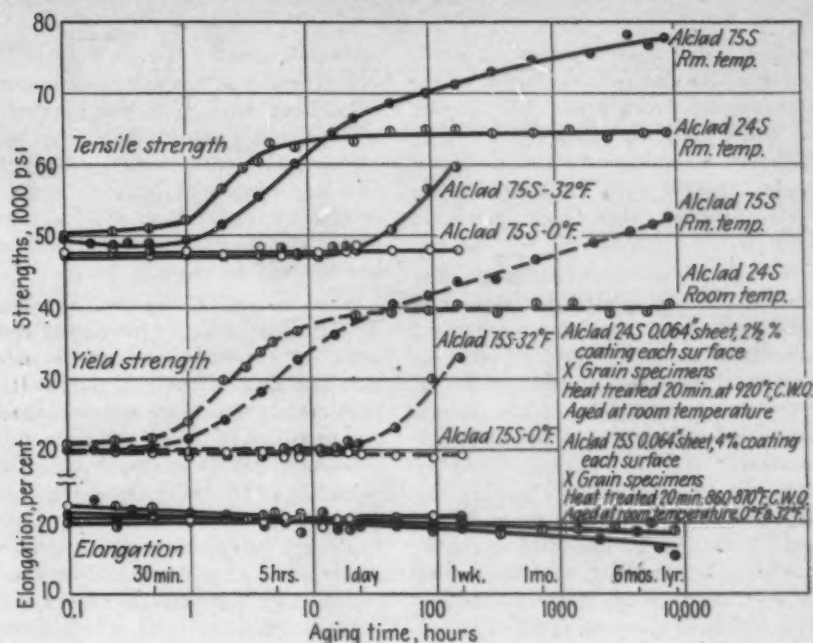


FIG. 1—Natural aging of Alclad 24S and Alclad 75S sheet.

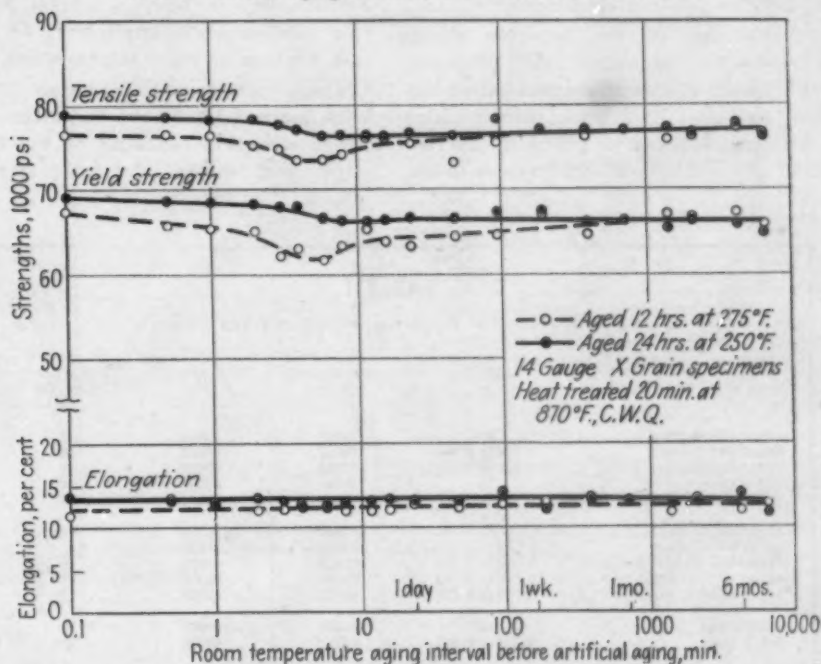


FIG. 2—Effect of interval between quenching and aging at 250°F and 275°F on mechanical properties of Alclad 75S-T.

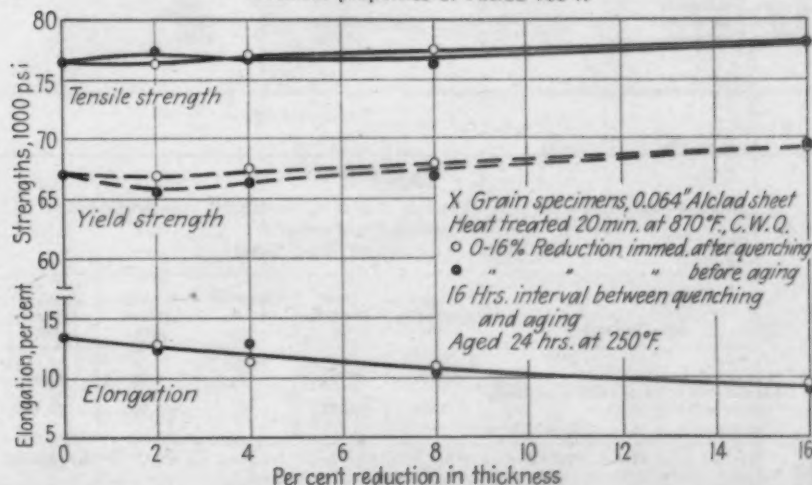


FIG. 3—Effect of various reductions in thickness on mechanical properties of 75S aged 24 hr at 250°F.

at 250°F and from 0 pct to 30 pct of cracked dimples in sheet aged by the interrupted procedures. The results of some dimpling tests made on 20 different samples of Alclad 75S-T sheet together with the tensile properties of the sheet are given in table II.

Tensile Properties: Although any one of the treatments just described produces sheet having mechanical properties above the specified minima, certain differences should be noted. Numerous plant tests have shown that the treatment of 24 hr at 250°F produces slightly higher tensile strength and elongation than the interrupted treatment of 4 hr at 210°F and 8 hr at 315°F. The yield strength, however, is generally slightly higher in sheet aged by the latter procedure. The differences are so small that the same specified minimum properties apply to both aging procedures.

The use of the two-step aging treatment for other 75S products, particularly extrusions and rolled bar or rod, has not been recommended because forming is usually carried out at elevated temperatures or in the

annealed temper, and the highest tensile strength is desired in these products. Data from a limited number of tests indicate that while the yield strengths of extrusions, aged by the two-step treatment, may be equal to or slightly higher than after aging at 250°F the tensile strengths and elongations will be slightly lower.

Resistance to Corrosion: Inasmuch as 75S alloy products have good resistance to corrosion and stress corrosion cracking in the -T temper (approximately the same as corresponding products of 24S-T) it is a time-consuming job to evaluate accurately the effect of changing the aging treatment on the resistance to corrosion. Prolonged tests in natural environments will be required. However, a preliminary appraisal has been made using accelerated tests which consist in exposing stressed specimens either continuously in boiling sodium chloride solution or intermittently in sea salt solution at room temperature.

These accelerated corrosion tests have indicated that the resistance to stress corrosion cracking of the material aged by the interrupted treat-

ments described above is at least equal and probably somewhat superior to that of material aged for 24 hr at 250°F. The resistance seems to improve with an increase in the temperature or time of the second aging step.

Effect of Cold Working

Cold working after quenching and before aging usually accelerates the aging of high strength aluminum alloys. The alloy 75S is no exception. Some of the effects of such cold work prior to various aging treatments are described below.

It has been found that material which has been cold rolled in the interval between quenching and artificial aging can be dimpled with fewer failures than material which has not been cold rolled. This was true regardless of the aging treatment used although the greatest improvements were noted in the material subsequently aged by the interrupted or progressive procedures. A reduction greater than about 3 pct or 4 pct is required to produce any noticeable improvement in dimpling capacity. Cold rolling of the magnitude required to make a significant improvement causes a substantial reduction in the yield strengths of the materials subsequently aged by either the interrupted or progressive aging treatments. Artificial aging for 24 hr at 250°F does not cause a reduction in the yield strength, but the dimpling capacity of the material is still inferior to unworked material aged by the interrupted treatment.

The effect of cold work is also of importance in those cases where it is advisable to form the part in the as-quenched temper and then artificially age. Small amounts of cold work (for example, 2 pct) are not of any practical significance because specifications were established for material which had been subjected to commercial flattening and straightening operations prior to artificial aging. For large degrees of deformation, the strengths increase if the material is aged for 24 hr at 250°F, but decrease if the material is aged by an interrupted aging procedure using 8 hr at 315°F as the final step. The tensile properties of sheet material cold rolled or stretched various amounts after quenching and subsequently aged by different procedures are given in figs. 3, 4, 5 and 6. It will be noted that the overall losses in tensile and yield strengths for the material aged by the interrupted procedure are approximately 1000 psi for each percent of permanent set. In production,

TABLE I
Typical Mechanical Properties of 75S and 24S Products

Material	Thickness, In.	Tensile Strength, Psi	Yield Strength, Psi	Elongation in 2 In., Pct
Alclad 75S-O sheet	All	32000	14000	16
Alclad 75S-T sheet	0.016 to 0.039	76000	66000	10
Alclad 75S-T sheet	0.039 to 0.249	77000	67000	12
75S-O sheet	All	35000	16000	14
75S-T sheet and plate	0.04 to 0.50	82000	72000	10
Alclad 24S-O sheet	All	25000	10000	18
Alclad 24S-T sheet	0.012 to 0.063	64000	43000	17
Alclad 24S-T sheet and plate	0.064 to 0.50	66000	44000	18
Alclad 24S-T81 sheet	0.012 to 0.063	66000	60000	7
Alclad 24S-T81 sheet	0.064 to 0.249	69000	63000	7
24S-O sheet	All	27000	11000	19
24S-T sheet	0.012 to 0.249	68000	46000	19
75S-O extrusions	All	40000	20000	12
75S-T extrusions	All	88000	80000	10
24S-O extrusions	All	30000	14000	17
24S-T extrusions	To 0.75	68000	53000	18
24S-T extrusions	0.75 +	80000	60000	13

TABLE II
Mechanical Properties of Materials Aged by Constant Temperature and Interrupted Procedures
(0.040 in. Thick Alclad 75S-T Sheet)

Aging Procedure	Tensile Strength, Psi	Yield Strength, Psi	Elongation in 2 In., Pct	Erichsen Values, mm	Dimpling* Failures, Pct
24 hr at 250° F	79100	67700	12	4.25	94.6
4 hr at 210° F + 1 hr at room temperature + 8 hr at 315° F	78400	68100	10	4.75	27.1

Alclad 75S sheet (0.040 in.) was solution heat treated at 920° F for about 30 min, quenched in cold water and aged as indicated. Tensile tests were made on duplicate X-grain specimens. *100° dimples for type AN426 rivets; 240 dimples per test.

stretch-formed parts are usually of such curvature that the full strengths of the material can not be used because of stability considerations. Hence in general the lower strengths will not be serious. Nevertheless, if such severely stretched parts are to be highly stressed, it would seem advisable to age the parts 24 hr at 250°F.

Summary

This paper has presented properties at 75S which are attainable by room-temperature aging, and by artificial aging at constant temperature or at a plurality of temperatures (that is, by a new procedure known as "interrupted aging"). In the absence of cold work, 75S aged by the interrupted procedure (consisting in heating 4 hr at 210°F, cooling to room temperature and then heating 8 hr at 315°F) has tensile properties closely approximating those of 75S aged for 24 hr at 250°F, a resistance to corrosion equal to or slightly better than that of 75S aged at the constant temperature, and a substantially better dimpling capacity. The interrupted-aging procedure has the additional advantage of requiring considerably less furnace time. The principal disadvantage of the interrupted-aging treatment finishing at 315°F is that it produces substantially lower strengths in material cold worked after quenching than does a constant-temperature aging of 24 hr at 250°F (about 1000 psi lower for each percent of permanent elongation).

UPPER RIGHT

FIG. 4—Effect of various reductions in thickness on mechanical properties of 75S. Aged 4 hr at 210°F + room temperature + 8 hr at 315°F.

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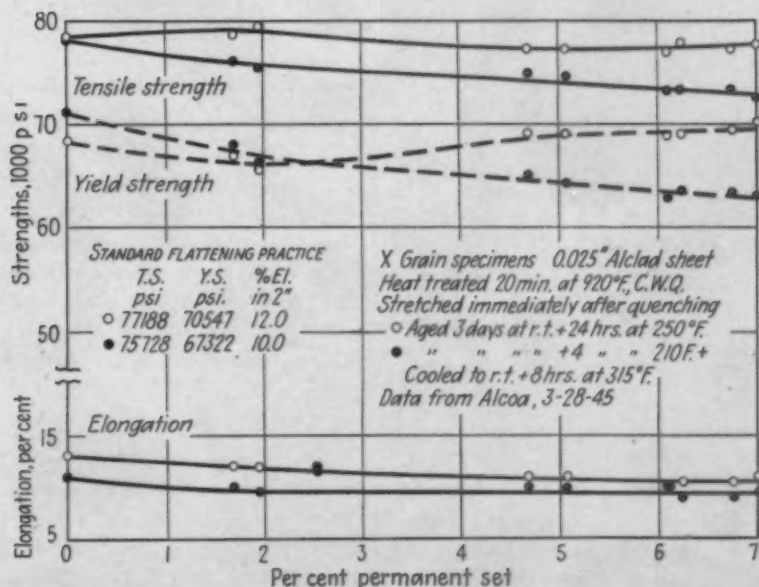
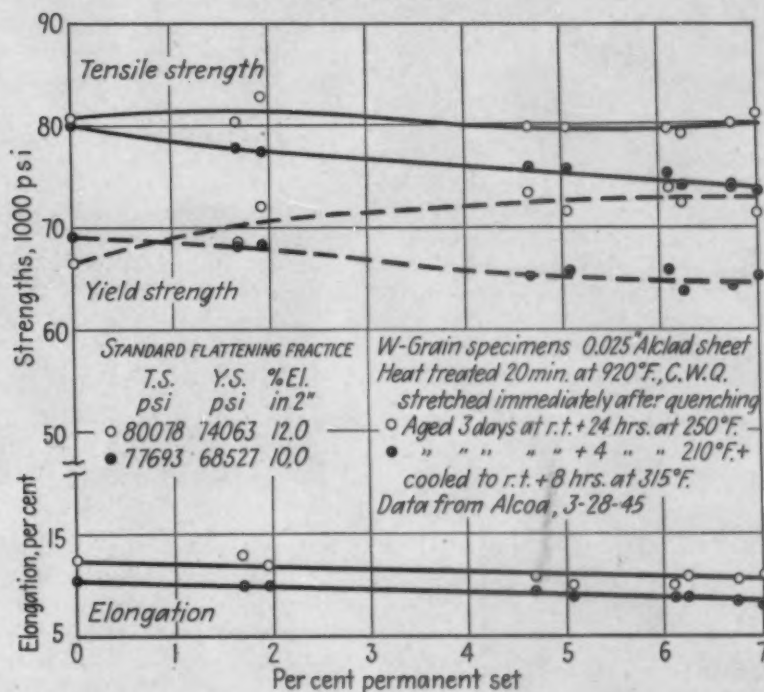
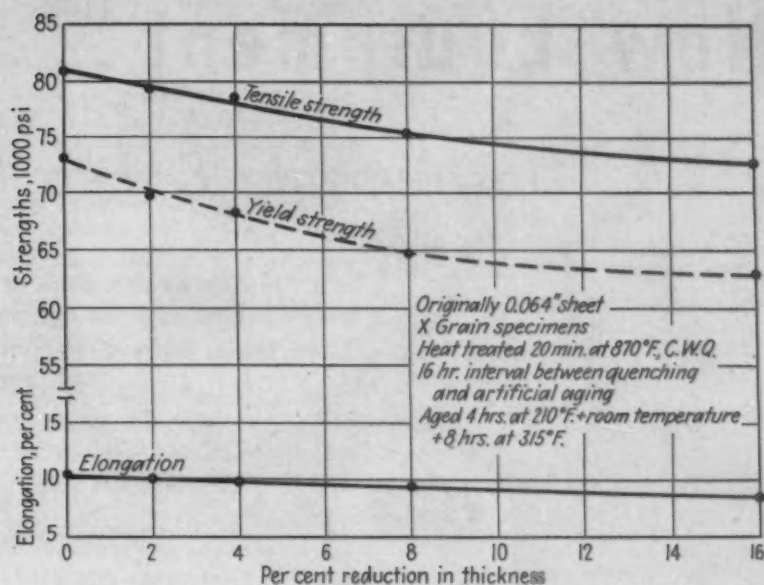
CENTER

FIG. 5—Effect of stretching on W-grain properties of 0.025-in. Alclad 75S sheet.

• • •

RIGHT

FIG. 6—Effect of stretching on X-grain properties of 0.025-in. Alclad 75S sheet.



New Equipment . . .

Instruments & Lab Equipment

. . . In this week's issue are described interesting developments in instruments and lab equipment, including several recorders, vibration table, instrument handles, tubes, baths, ram pacer, sand rammer, and various accessories.

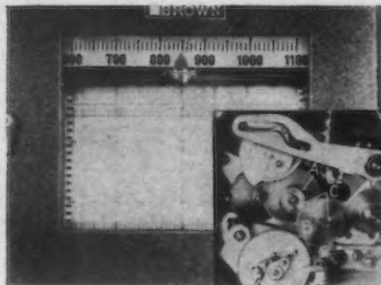
AN instrument that is said to make practical the taking of a hardness test right where the material is, instead of taking a specimen to a testing machine, has been announced by *Steel City Testing Laboratory*, 8843 Livernois, Detroit 4, and is called a portable Hardness Testing Hammer Type "P." This self-acting hammer works quickly with any unskilled labor. Repeated tests can be made without readjusting the hammer. If material of a certain degree of hardness is to be detected, it is only necessary to see whether the diameter of the impression made, corresponds to the desired degree of hardness, as shown on a chart provided. The hammer consists of a cylindrical housing and easy



moving piston. It is closed on one end with an inside thread cover and on the other end with an open bushing. The piston is coupled with a striking piston, which projects through the bore of the bushing guided by an airtight fitting ring in the cylinder and carrying a steel ball on the end. Resting the ball against the work and pressing on the operating end compresses and then trips a spring, delivering a metered blow to the striking piston and causing the ball to indent the work.

Electronic Recorder

INCREASED industrial use of electronic recorders has been made possible by stepping up chart speed of *Electronik Pyro-Potentiometers*, according to an announcement made by *Brown Instrument Co.*, Wayne and Roberts Ave., Philadelphia. The standard speed electronic recorder, single or multiple point models, in-



corporate gear changes for speeds of 5, 10, 15 and 20 in. an hour, it is claimed. Fast speed electronic models, single or multiple point, will have internally mounted gears for speed of 10, 20, 30 and 40 in. an hour. The gears are changed by removing screw from gears and by lifting the gears from the assembly. The new speed gears are then installed and screw is replaced.

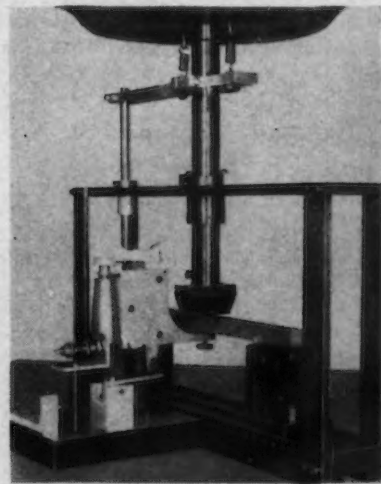
Instrument Handles

INCREASED user convenience through improved portability of industrial instruments has been announced by *Brown Instrument Co.*, Wayne and Roberts Ave., Philadelphia. The improvements consist of assemblies, comprising handles and parts, furnished unmounted so purchasers can attach them according to individual requirements. Two assemblies will be available. These will consist of: (1) A cast carrying handle, plus parts, for smaller instruments such as meters and gages. (2)

Two locker type carrying handles, with feet and necessary assembly parts for heavier potentiometer types, including electronic.

Deflectometer for Plastics

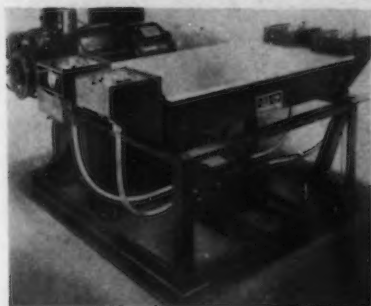
IN completing their present line of equipment for testing the many different molded plastics, plastic laminates, and woods, the *Southwark Div.* of the *Baldwin Locomotive Works*, Philadelphia 42, has announced a combination flexure tool and deflectometer for testing those materials. The deflectometer measures the deflection from the center of the specimen and conveys this to an autographic stress-strain recorder which gives the load derelection curve. One of the features of this instrument permits the oper-



ator to adjust the magnification of the deflection in multiples of 5, 10, 20, 50, 100 and 200 times. The high magnification ratio is used for very stiff and brittle materials that deform only slightly before breaking. The deflection is measured in terms of thousandths of an inch. The low magnification permits recording large deflections which may be as much as two inches with very flexible materials.

Vibration Test Table

A REACTION type Vibration Test Table, used to shake out faults in assemblies and components, has been announced by *L.A.B. Corp.*, Summit, N. J. Simplicity, ruggedness and careful scientific engineering based on years of experience in this field, are claimed for this equipment. The large table top is supported by four vertical rods acting as flexing columns to permit free table vibration in the two horizontal directions. Four



sets of rotating eccentric weights induce rectilinear and pure harmonic vibrations. These weights, mounted on vertical shafts, are driven by a variable speed drive through a synchronizing gear box and flexible shafts. These vibration test tables are said to expedite correction of design and manufacturing errors, avoiding expense, embarrassment and time-consuming field tests. Weaknesses which might ultimately show up after shipping or in use, are predetected through vibration testing.

Recording Galvanometer

DIRECT ink on paper chart recordings of wider frequency range and greater sensitivity than heretofore attainable are made pos-



sible by the Brush Recording Galvanometer, recently announced by *Brush Development Co.*, 3405 Perkins Ave., Cleveland 14. It embodies a low mass,

3 in. long tapered tube recording pen, actuated by a permanent magnet pen-motor utilizing newly developed material and techniques. The Pyrex tipped pen records directly in ink on a moving paper chart, pressures, vibrations, strains, currents and voltages of frequencies from DC to 120 cycles per second. It has no overshoot up to 70 cycles per second at a maximum swing amplitude of 20 mm each side of center line. Frequency response flat to 70 cycles per second, accurate to 120 cycles per second. Pen can be conveniently centered on, or raised from chart. A large ink well minimizes frequency of refilling, and the galvanometer only weighs 4 lb.

Sand Rammer

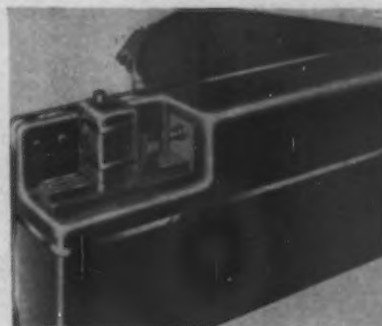
BUILT in accordance with A.F.A. specifications, an improved sand rammer for use in foundry sand testing laboratories has been announced by the *Harry W. Dietert Co.*, 9330 Roselawn Ave., Detroit 14. In this sand rammer are incorporated the following improvements: (1) Longer weight raising cam bearing. (2) Take-up on weight raising cam bearing. (3) Lever cam for conveniently and easily raising rammer-plunger-



weight assembly during the loading and unloading cycle. Insures a uniform impact between plunger and sand on loading. (4) Greater strength in rammer support frame. (5) Greater weight in rammer base. (6) Modernistic design permits easier cleaning. (7) Flowability indicator mounted on top of sand rammer to improve visibility, cleanliness and the life of indicator by reducing shock.

Grating Spectrograph

DESIGNED for the analysis of highly alloyed ferrous metals and other materials containing complex spectra, as well as for general research work, a two meter grating spectrograph has been announced by *A.R.L. Dietert*, Glendale, Calif., & Detroit. It is said to be capable of identifying 72 elements, and may be used for identification, sorting and miscellaneous or research applications, as well as routine or research quanti-



tative analysis. Controls and camera are located at the same end of the instrument. A single control panel governs shutter timing, camera and aperture racking and grating door opening. The instrument is so constructed that it is possible to enclose the camera side in a dark room.

Ram Pacer

IN testing metals, plastics and woods many specifications require that the loads be applied at certain and exact speeds. To date this control has been difficult to obtain as no sim-

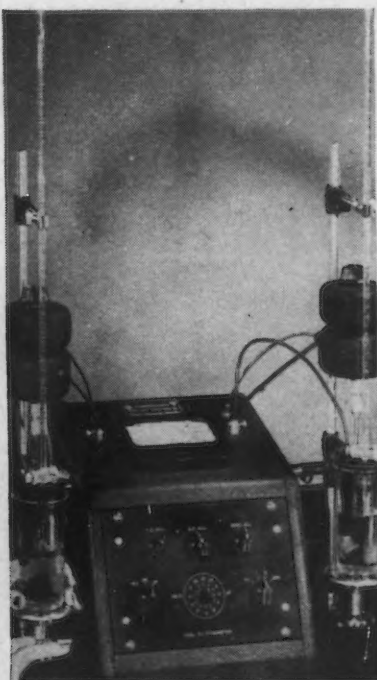


ple, fully automatic and satisfactory pacing device has been available. To fill this important need, the *Southwark Div. of the Baldwin Locomotive*

Works Philadelphia 42, has announced the Southwark Ram Pacer. The device, which attaches to a standard hydraulic testing machine, gives control over the crosshead movement at eight present speeds. These speeds are obtained by gear changes on the synchronous motor drive unit. This unit is attached to the fixed frame of the machine while the dial portion of the apparatus is attached to the moving crosshead. The pointer sprocket wheel and the sprocket wheel on the drive unit are connected by an endless weighted chain. With the gear selected for a certain speed the hydraulic valve of the testing machine is opened until the loading head rises to a point where the dial pointer stands still. This means that the pointer sprocket and the motor driven sprocket below are moving at exactly the same speed. They counteract each other. This ram pacer is a combination tool since it also can be used as a deflectometer.

Electronic Titrometer

FOR determining the free and combined acidity of material in either aqueous or non-aqueous highly colored or opaque solutions, a titrometer has been announced by *Precision Scientific Co.*, 1750 N. Springfield Ave., Chicago 47.



This eliminates the uncertain and inadequate color indicators. This instrument was originated primarily for determining the acidity of highly complex mixtures of lubricating oils, either completely opaque or so dark in color that the routine acidimetric color titrations could not

be made. However, it is said, that the titrometer has been found applicable to determine the acidity of used lubricants, detergents, fats, turbine oils, oil additives, motor oil sludges, asphaltene, crude oils, asphalt, asphalt residues, distillates, distillate bottoms, polymers, rubber, vegetable and animal oils, fats, waxes, greases, common solvents and other water solutions. The potentiometer method is reliable and reproducible, and the titration media is capable of dispersing or dissolving sufficient quantities of the water insoluble materials under test. The titrometer is portable, has a power consumption of 10 w and is suitable for continuous duty.

Geiger-Muller Tube

DESIGNED specifically for detecting minute pulses of invisible radiation, a Geiger-Muller tube has been announced by *North American Philips Co., Inc.*, Mt. Vernon, N. Y.



Its use by scientists at the New Mexico scene of the first atomic bomb explosion in surveying the area for possible dangerous after effects, has heightened interest in this electronic device. The extremely high sensitivity of the tube is said to enable it to detect extremely minute traces of X-radiation and similar emanations. The formation of a single ion pair anywhere within the active volume of a counter tube releases a flow of current which can be translated into a meter reading. In its simplest form, the tube consists of a central wire electrode and a concentric cylindrical metallic electrode separated by an atmosphere of noble gas such as argon and often containing an organic quenching additive, such as alcohol, to terminate the pulse once the triggering flow of radiation has ceased.

Gas Analyzer and Recorder

AN automatic analyzer and recorder for indicating, recording and controlling the combustibles content of a gaseous mixture, has been announced by *Bailey Meter Co.*, 1050

Ivanhoe Rd., Cleveland 10. This instrument has been applied to precision control of furnace atmospheres and chemical processes, as well as combustibles measurements in the petroleum, metallurgical, automotive, and chemical industries. The analyzer and recorder provide a continuous graphic analysis almost instantly, and they are said to be responsive to changes of 0.05 pct combustibles. Sustained accuracy is said to be within 0.25 pct. Combustibles Recorder-Controllers applied to process furnaces operating with reduced atmospheres are said to permit finer measurement and control than has heretofore been considered possible. This results in greater uniformity and higher quality of product, as well as greatly increased furnace economy. Variable fuel quality does not affect the accuracy of control on installations of this type.

Aging Bath

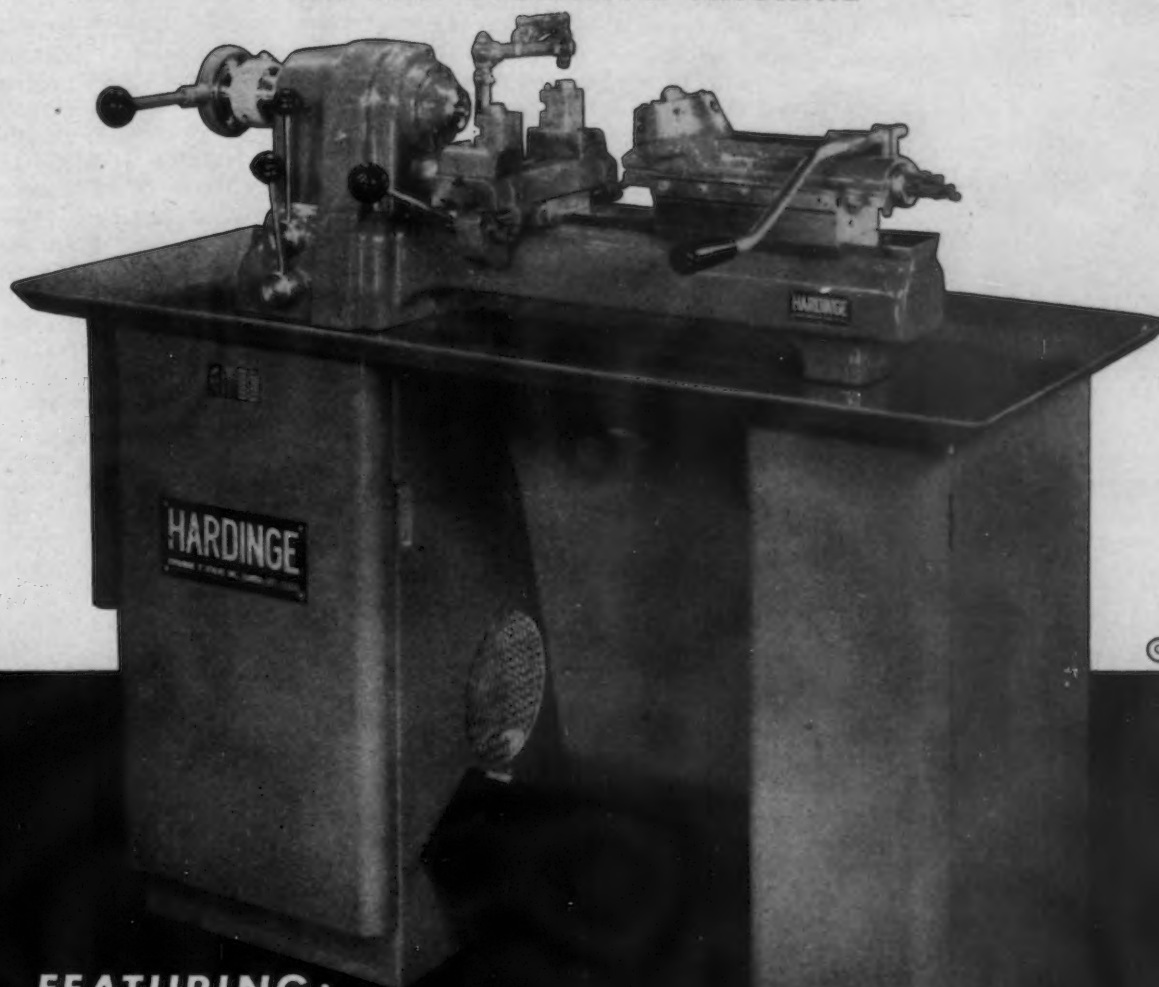
AN aging bath of the oil immersion type for aging rubber or elastomers in oils or liquids in test tubes, according to ASTM P-471 and D-735, has been announced by the *Precision Scientific Co.*, 1750 N. Springfield Ave., Chicago 47. These tests are intended for use in estimating the comparative ability of rubber and other elastomeric compositions to withstand the effect of immersion in



oils and liquids. It may be used to secure comparative data on which to base judgment as to the service quality, and is especially useful in research and development work. This bath can also be used for aging rubber and elastomers in air in test tubes.

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• Discussions between General Motors and the Auto Union seize first place in the papers . . . Both sides stand firm in present positions . . . New cars shown by Chevrolet.



DETROIT—Labor took over the front pages this week here, what with negotiations in the all-important General Motors case moving ahead under full steam against the background of a strike vote which clears the way for walk-outs at any time the CIO-United Auto Workers Union wishes to begin them.

The vote was taken Wednesday under the Smith-Connally Act and resulted in about the expected margin of favor for a strike. Of 325,000 eligible voters, of whom about 128,000 are on the payrolls today, 83,655 cast votes. Of these 70,853, approximately 85 pct voted in favor of a strike. Another 12,438 voted against it; the other ballots were void. Harry W. Anderson, vice-president in charge of personnel for General Motors, characterized the strike vote as "putting the shell in the shotgun."

Meanwhile negotiations took place all last week between the company and union, and they proved to be pretty much of a monolog, with Walter Reuther, head of the UAW General Motors dept., spending most of the time reading and explaining a lengthy "economic brief" intended to show that General Motors, by increasing volume, can raise wages 30 pct, pay necessary increases in materials, and at the same time earn enough more net income so that car prices can be reduced and increased dividends paid to stockholders.

"An Alice in Wonderland theory" was the way this thesis was characterized by a company spokesman. In this same regard might be quoted a General Motors official who stood looking at the new Cadillacs on display in the lobby and remarked: "Sloan and Wilson have certainly been missing some bets. Now if we put out a car that costs three times as much as the Cadillac, we could probably reduce the price \$2000 and then look at all the additional money we would make! I think I better speak to them about that."

Proceedings inside the negotiations came into the public eye at the behest of Reuther, who first called for admittance of the press to the meetings, and then, thwarted, held a series of press conferences after every session to explain what went on. The newspapers made full use of Reuther's reports on the meetings except for one session, after which General Motors felt itself goaded into explaining its own position and held a press conference itself.

As near as can be accurately gathered, the corporation people did little more last week beyond being polite and listening to the elaborate UAW presentation. The "economic brief" was concluded on Friday, and this week General Motors statisticians and economists were hard at work preparing a rebuttal, whose conclusion will be diametrically opposite to that reached by the union.

THE company position is that any wage raises are completely impossible as long as present price regulations prevail. In fact General Motors maintains that the OPA price formula is so inadequate that in order to compensate for increased costs in overhead, parts, capital goods and other items of expense, it will be necessary to increase volume 50 pct above pre-war levels.

A counter-proposal by the company offers to trade a wage raise for reduction of overtime premiums, which would probably maintain take-home pay at better levels. This proposal is for a 5 pct raise or thereabouts, with the standard work-week set at 45 hrs. In other words, overtime on the last 5 hr would be eliminated. Union people reject this proposal, but that is to be expected in any event at this stage of the negotiations.

The company has made no firm

indication as to what it will do if anticipated government policy materializes in favor of a 15 pct pay raise without any increase in prices, but on the basis of its position thus far it will hew to an unchanged line.

A word should be said here about this reported government policy. There is much to be said for the viewpoint that any narrowing of profit margins, such as the reported Washington program contemplates, may not ruin big companies with efficient production records, but will definitely eliminate marginal producers. Washington it seems is being extremely shortsighted in any such program—small companies may shrivel and die, big companies may dominate more completely than ever before the economic scene, and we may be well along on the road toward the evils of monopoly.

The automotive community was thrown into consternation on the wage situation early last week when Henry Ford II returned from conferences with Washington officials to the tune of rumors that he had agreed to a 15 pct pay raise for his employees. These stories had all the earmarks of being "planted," because there was no basis of truth in them at this time. It can be said flatly that Ford has not determined any policy on wages for the time being. Any decisions which will be made will be the result of negotiations with the auto union, scheduled now to begin Nov. 20.

TWO more automobiles have made their appearances in the 1946 model race, Chevrolet and Nash; Chevrolet goes on sale this weekend.

The new Chevrolet models are presented in three lines, Stylemaster, Fleetmaster and Fleetline. The Stylemaster 4-door sedan is the initial vehicle of production, with town sedans, business coupes and other types to follow as soon as production schedules permit.

Typical new grille and bumper treatment dominate the appearance changes of the new Chevrolet. As in more expensive cars, the Chevrolet bumpers extend around the fenders for additional protection.

Engines in the new cars are equipped with light-weight cast alloy iron pistons, standard on Chevrolets for many years past. A specialized lubrication system forces oil under pressure to functional parts immediately

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on motor starting, providing lubrication at this important time.

A ribbed cellular radiator core is the heart of the cooling system, shaped square to permit efficient coverage by the fan. A ball bearing water pump of efficient design is self-adjusting and permanently lubricated. Uniform cylinder cooling is provided by full length water jackets extending completely around each cylinder.

The chassis frame used in all new models is the Chevrolet standard box girder type with side rails and cross members of flanged box section construction, insuring exceptional rigidity. In cabriolets box girder side rails are further reinforced by "V" and "K" shaped I-beam girders.

A semi-floating type gear axle, with gear ratio of 4.11 to 1 has hypoid drive gears and six ball and roller bearings.

New 1946 Nash cars are now being produced at Kenosha, and first shipments are being made preliminary to a general public showing scheduled in November. Output at Nash, originally scheduled to start Oct. 1, was held up almost a month by delays in delivery of minor parts from outside suppliers.

First production is being limited to 4-door sedans in the low price "600" and medium price Ambassador lines. Other body styles will be manufactured later.

The "600" has been restyled completely, and features greater body strength. Single unit welded steel body-chassis construction eliminates weight in the conventional body frame. In all, 119 changes have been made over the 1942 lines.

SERVICE STATION DE LUXE: *A luxurious looking but practical design is this portable stainless steel service station of tomorrow which lends itself to mass prefabrication. With each canopy-and-service-island unit separate and portable, as is the office and storeroom cubicle, the units could be changed around to suit space or traffic requirements.*



Nash estimates that its annual production rate will reach 150,000 units during next January and will have extended to 250,000 by next June.

Stainless Steel Used As Basic Material In Service Station Design

Pittsburgh

• • • Recognizing that for practically half a decade there has been little or no new developments in the automobile service station field, Allegheny-Ludlum Steel Corp., commissioned George Cooper Rudolph, head of the New York industrial design firm bearing his name, to suggest a design for a stainless steel service station of tomorrow. Mr. Rudolph, taking into consideration outlet facilities, new materials, new light and color uses, and merchandise display, developed the Moto-Serv design, an idea that strikes out along several novel lines.

"It has, first of all," said Mr. Rudolph, "the fundamental simplicity that lends itself to mass prefabrication and the ease of installation on the site, with all the economies inherent in these advantages, and has flexibility in station planning. The basic design consists of the office and storeroom cubicle, and a single island-and-canopy unit with two stainless steel tubular supports footed in stainless castings. It can be easily varied to suit either the amount of traffic or site of location. More island-and-canopy units can be added in a straight line, parallel lines, in the form of an L, a T, or a cross.

"Stainless steel is the chief material of fabrication, being used in one of the building panel forms which have been developed and widely used. This is a stainless steel surface bonded to plywood or composition material, giving a panel easily and quickly installed with stainless flat and corner moldings. The low pump units, each housing gas, air and water supply hoses, and the framing for the glass display case connecting the pumps, would employ either solid stainless or Pluramelt stainless clad steel, satin finished to prevent headlight flash backs. Reflectors behind neon brand name or company sign and behind the fluorescent light wells over the service island would be bright polished stainless.

Jack & Heintz Enters Automobile Industry

Cleveland

• • • Entrance of Jack & Heintz, Inc., into the automobile field was hinted this week by William S. Jack, president.

Announcing that Jack & Heintz now own a capital of \$5,000,000 and that the company was being reorganized and would have a capitalization of \$50,000,000 to back its peacetime program, Mr. Jack said that the company would soon begin to manufacture a new type gasoline engine (probably the Skinner) a revolutionary "hot-water" refrigerator and other new products.

Mr. Jack asserted, "The world is our market. We may be producing our own automobile before the close of 1947."

According to reports, the new Jahco automobile, which is hardly beyond the drawing board stage, is about the size of an Oldsmobile with the mechanical attributes of a Cadillac.

White Announces Expansion

Cleveland

• • • Robert F. Black, president of White Motor Co., has announced that construction work is about to begin on a million dollar plant in Montreal, Canada, for the manufacture of motor trucks and buses. Operations will be conducted by the White Motor Co. of Canada, Ltd., a subsidiary headed by L. M. Hart.

Mr. Black said that while White trucks and buses had been partly built in Canada since the earliest days of the automotive industry, the new facilities would permit production of component parts as well as vehicles.



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Lincoln Park has a department devoted exclusively to special work. Here the experience of skilled gage makers and the facilities of one of the country's finest gage plants are combined to produce extremely accurate special gages, tools, dies, fixtures and parts. Let us show you how the services of this department can be used most advantageously by you.



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Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

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• General Somervell reveals miracles of production and management achieved during the war . . . Pays highest tribute to the teamwork of Ordnance and industry.



WASHINGTON — Unfolding a fast moving drama of the production of such miracles as radar, penicillin and the atomic bomb, Gen. Brehon Somervell, Commanding General of the ASF, in his report for the fiscal year 1945 pays high tribute to management, which directed the production and procurement of some \$34 billion worth of guns, tanks, ammunition and vehicles for American forces in World War II. Another billion, he pointed out in a section dealing with the Ordnance Dept. designs and procedures, was devoted to operational costs, to experimentation, schools, distribution, salaries and wages. A billion dollars worth went to lend-lease.

"The miracle that produced all other miracles," General Somervell reported, "was something even more American than any one of them. It was the organization and vitalizing of this vast machine. It was the miracle of management."

Ordnance and American industry, working as a team, General Somervell declared, built 2,500,000 trucks, 500,000 self propelled guns, 88,000 tanks, 133,000 other types of combat vessels.

"This was big business," he said. "It cost big money. It was a decisive factor in winning a big war."

At the beginning of the war, it was explained, the Ordnance Dept., realizing that there dared be no com-

petition in wartime, not only led in welding together the great corporations which never before cooperated, but secured the approval of Congress to set up Industry Integration Committees. Thus, the report added, for the period of the war the automotive and kindred industries became a single closely-knit organization which integrated tools, equipment, personnel and ideas.

"Together with the Ordnance Dept. they made an unbeatable team," General Somervell observed.

Industry furnished many Ordnance officers, it was pointed out. Constant improvements in methods, constant checking and rechecking, reduced the cost of guns and ammunition and trucks, the report said. At the end of the fiscal year 1944, it was stated, costs were down 16.9 pct under the scales in effect 24 months earlier. Between 1943 and 1945 the price of the 80,000 lb 240 mm Howitzer dropped from \$113,410 to \$84,621, while anti-aircraft guns of one type which cost \$8651 at the beginning of the period were obtained for \$2807 at the end of the war. At the same time quantity was being stepped up and costs were being reduced, the quality of American weapons was steadily improved, General Somervell said. Expanding this point he explained that the muzzle velocity of medium tank artillery was increased 50 pct and the range of anti-aircraft artillery was doubled. Tanks were said to be seven times as speedy as they were and individual firepower of the soldier two and one-half times as great as in the last war.

"Among the year's miracles was the new recoilless rifle produced by Ordnance," the report said. "Guns of .57 and .75 mm which formerly had weighed many hundreds of pounds can now be carried and handled by two men and be fired from light tripods. Together with the 'VT fuse' the recoilless guns were the most startling developments of the war until the moment the atomic bomb exploded."

Other miracles came to pass in this year, said General Somervell. Long a dream of artillerymen, he declared, was a shell which would burst of itself when at the optimum distance from the target, burst without man-made errors in estimating dis-

tances and altitudes in fuse setting. Such self-operating shells came into being with the "VT" fuse, it was pointed out, and hurled with deadly effect against the enemy. Though it probably should be classified as impossible rather than miraculous, General Somervell asserted, the mobile 36-in. mortar, firing a shell weighing nearly two tons and designed for use against the Japanese citadel, was completed, tested and ready for shipment before the year-end.

"Landing mats, those prefabricated airfields built on the assembly lines of American industry and assembled practically overnight in jungles, on deserts, along the beaches where no plane had ever come to earth before, were miracles in their own way, and gave strength to our soldiers wherever they were spread," the report continued.

"Early in the war the ASF had set up its most secret of secret projects. It was dubbed, disarmingly, 'the Manhattan Engineer District.' With \$2 billion, 125,000 workers with all the resources of American science, British aid, our university and industrial laboratories, the Army Engineers began the production of atomic bombs.

"The job was so immense, the problems to be solved were so unprecedented, the gamble and the risk were so breath-taking, the miracle is that results were ever secured . . . and in secrecy. Our enemies were in the race. Only the winner could survive. Thanks to everyone connected with the work, from General Groves who was in charge of the project, his scientist associates, the Air Forces, the Navy, industry and other cooperating agencies, down to the humblest workman, we won the race."

Most spectacular engineering project of the war, of course, said the report is "Manhattan Engineer District" which produced the atomic bomb, "the greatest calculated risk in history." The site is Oak Ridge, Tenn., built by Army engineers who also built the plant of the Clinton Engineering works which produced the first bomb. A second project in atomic bomb development is the Hanford Engineering works near Pasco, Ore., which sprawls over 100,000 acres.

Telling of the problems that ASF

3/8" CUT ON NICKEL STEEL

AT 230 S.F.P.M.

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Proves Its Worth Under Severe Operating-Conditions, Lengthens Life of Tools, Cuts Down Re-Grindings

When heavy cuts and heavy feeds are being taken on nickel steel . . . and peak production is to be achieved . . . it is essential to maintain accurate cutting-edges with long intervals between grinds.

Here is a case where a manufacturer's preference for Sunoco Emulsifying Cutting Oil is based on that type of performance.

Operation Rough turning forged spindle
Machine Monarch 20" Model "M" engine lathe
Material S.A.E. 2350
Surface Cutting-Speed 230 feet per minute
Depth of Cut 3/8"
Feed per Revolution015"
Type of Tool Tantalum Carbide
Cutting Lubricant 1 part Sunoco to 10 parts water

Sunoco has won the approval of leading machine-tool builders and metal-working plants for its outstanding work in a wide variety of tough metal-cutting operations like this on alloy steels, forgings, and other jobs where carbide tools are indicated.

The outstanding lubricating, heat-absorbing, and rust-preventive qualities of Sunoco make possible longer runs between regrinds, greater accuracy, better finish, fewer rejects, and worthwhile savings in production-time. Let a test, run on Sunoco in your own plant, under your own operating conditions, convince you.

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SUNOCO

SUN INDUSTRIAL PRODUCTS

OILS FOR AMERICAN INDUSTRY

faced, General Somervell said that the "pitifully small beginnings" available to build an Army served only to magnify the enormous task ahead. Time, that most precious and most expensive element, he said, would be the major factor in the program.

"To bolster our own determination and to fortify the weaker spirits," the General reported, "ASF adopted a brash and boastful slogan: 'The Impossible We Do at Once; the Miraculous Takes a Little Longer.'"

After tracing the difficult steps in organizing ASF until it was fully developed into a world-wide organization of almost limitless activities, the General said, "One of the miracles has been that there have been so few errors of judgment, so few false starts, so little thievery, so little graft or misappropriation of funds."

Recasting of ASF into final shape, he said, left remaining in it only the producers, those who had the courage to take a long chance to attain a difficult end.

"All others," it was pointed out, "had to go, to make way for men who believed in the slogan, men with enough self-confidence, conceit or egotism, if you will, to convince themselves that they could accomplish the impossible at once."

"The men came from the Army, from industry, from the railroads and steamship lines, from the laboratories of great universities, from banking and business, from the professions. By the end of the second year, only 3 pct of the ASF officers were professional soldiers. The others had come from civil life, had put on the uniform and gone to work."

quest of the parties concerned. The Board itself will not hear the merits of any new case. Appointment of arbitrators will be approved by the public, industry and labor members of the National Board or appropriate Regional Boards.

In cases received by the Board prior to Oct. 22, containing joint stipulation of the parties to accept a decision as final and binding, the Board and its agencies will continue to issue directive orders. Appeals to the National Board will be permitted unless the stipulations specified that the parties had agreed to accept the decision of the Regional Board or Commission as final. Appeals from directive orders which have been issued prior to Oct. 22 will be processed by the National Board and directive orders will be issued as in the past. In other cases not decided before that date, the National and Regional Boards and Commissions will process the case and issue recommendations only. No appeals may be made from recommendations of the Regional Boards and Commissions.

There will be announced later a program for carrying out the functions required under the Stabilization Act passing upon such voluntary wage adjustments as require approval, and acting upon violations of wage stabilization regulations, until termination of that Act, June 30, 1946.

War Labor Board To Fold Up; Labor Dept. Will Handle Disputes

Washington

• • • Once the center of stormy labor-management controversies, the WLB now is only of pint size compared with its former formidable stature. Singing its swan song, it has announced that it will fold up "at least by Jan. 1, 1946, and by Dec.

15, 1945, if possible." With the Board out of the picture, the conciliation service of the Labor Dept. will be the only service left to deal with labor disputes, but it is expected that another board or commission is set up to replace WLB.

Effective Oct. 22 the Board said it would act only to the extent of naming an arbitrator or arbitrators to decide issues but up to that date it would continue its policy of issuing decisions in new cases upon joint re-

THE BULL OF THE WOODS

BY J. R. WILLIAMS



Inventory Control For Tin and Lead

Washington

• • • Specific controls on inventories of tin and lead scrap and prepared used tin cans in the hands of dealers were established by WPB on Oct. 24, by issuing Direction 5 to PR 32.

The direction provides that a scrap dealer may not accept deliveries of tin and lead scrap unless the quantity of scrap he has on hand is equal to or less than the amount of scrap by weight he has delivered to others during the preceding 60 days. It also forbids receipt of prepared used tin cans by a broker or dealer if acceptance would give him an inventory of more than 60,000 lb of such cans.

The direction does not prohibit acceptance of scrap or prepared used tin cans in transit on Oct. 24, nor does it apply to smelters, manufacturers, detinners or other users whose inventories are controlled by other WPB regulations.



It is reported that

"Liquid Envelope" is the new commercial coating that has been used to protect fighter planes in shipment. It may be sprayed, dipped or brushed, hot or cold. *Better Finishes & Coatings, Inc., Newark, New Jersey.*

get ready with CONE for tomorrow

Three iron companies are co-operating in a joint photographic aerial survey of the Marquette Range as an aid to more detailed exploration. *Engineering & Mining Journal.*

get ready with CONE for tomorrow

A new electrical instrument is said to be so sensitive that it can measure movements as small as one ten-millionth of an inch without touching the object. *Battelle Memorial Institute.*

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A scientific journal reports that a new type of mechanical refrigerator, employing a high-speed rotor as its only moving part, can produce temperature drops as great as 220 degrees and can, by modification, be used as a heat pump for such purposes as the heating of homes in winter. *Journal of Applied Physics.*

get ready with CONE for tomorrow

Stainless steel is being made for a black surface finish suitable for the bottoms of cooking utensils and for many applications where reflections or glaring light are a disadvantage. *Business Week.*

get ready with CONE for tomorrow

The announcement by one radio manufacturer of a new set not much larger than a package of cigarettes is expected to be followed by a rush of similar announcements by other manufacturers. *Sentinel.*

get ready with CONE for tomorrow

Prisoners of war are constructing a model of the Mississippi River drainage area to permit the study of complex problems of drainage for the co-ordination of flood control measures. *Engineering News Record.*

The Great Lakes Research Institute has been organized to do for these inland seas what the Woods Hole Oceanographic Institute has been doing for the Atlantic.

get ready with CONE for tomorrow

The Army is packing guns and other weapons and surplus material in steel or aluminum "cans", in an atmosphere of nitrogen, for storage. *Air Technical Service Command.*

get ready with CONE for tomorrow

Stainless steel can now be cut with an oxy-acetylene torch almost as easily as mild steel. *Air Reduction Sales Co., Rustless Iron & Steel Corp.*

To aid the war-to-peace reconversion of scientific research, the Senate's subcommittee on war mobilization recommends that Congress create a National Science Foundation as an independent government agency.

get ready with CONE for tomorrow

Power steering, which has been discussed speculatively for automobiles, is being used on one model of dump truck. *Heil Co.*

get ready with CONE for tomorrow

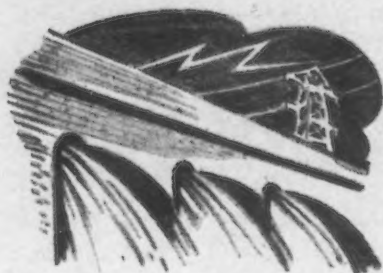
America's first jet-propelled plane is now a museum piece at the Smithsonian Institution. *Science News Letter.*

get ready with CONE for tomorrow

A new portable hardness-testing hammer is spring-operated and, being portable, can be used to test pieces of metal of any size, anywhere. *Steel City Testing Laboratory, Detroit.*



• First step toward new \$90 million Bay Bridge . . . Bethlehem to build new openhearth and rod and wire mill . . . Cyrus Eaton says Fontana can't operate economically on war cost basis.



SAN FRANCISCO — Construction of a second Bay bridge will be recommended to the California Toll Bridge Authority this week by the nine-county Bay Area Council. The recommendation may also gain the support of the bridge engineering dept. of the Authority itself.

Traffic on the present transbay structure has reached the threshold of the theoretic saturation point already with a normal daily flow of 71,000 cars and peak traffic of 78,000 against the rated capacity of 80,000. In actual practice the present toll gate constitutes a bottleneck which reduces the theoretic capacity to a point which has already been passed.

The Authority plans to take temporary steps to relieve the congestion by routing part of the traffic to the north of the toll gate on a new road, but this is admittedly a stopgap.

Two plans for a new bridge are apparently in circulation. One is for a structure paralleling the San Francisco-Oakland Bay Bridge originating on the west end of Telegraph Hill in the heart of the city and ending on the northern side of Goat Island opposite that which accommodates the present bridge. The second span is to parallel the one now in use.

The second contemplated plan involves two bridges in the vicinity of Hunters Point, site of the Navy's

repair yard and drydock in the southern reach of the Bay.

Plans for this pair of bridges, one high-level and the other low, were prepared by a joint Army-Navy committee appointed in 1941. Members are Col. Gustave R. Lukesh, senior member and chairman; Col. Warren T. Hannum and Col. William A. Johnson; Navy Captains John W. Lewis, Carl T. Osburn and Henry G. Taylor.

The committee submitted its report to the Secretary of War in November 1941 and for obvious reasons no action was taken at the time. The report, complete with sketches of the two truss type bridges is apparently the closely guarded secret of the chief of engineers of the U. S. Army in Washington. The State of California requested a copy for the study of the dept. of public highways and the request was refused.

Plans for the two bridges, as nearly as the surrounding secrecy can be pierced, call for a low-level structure south of Hunters Point apparently designed for automobile and truck traffic, and a high-level double-decked span north of Hunters Point. This second span has plans of considerable importance to San Francisco's industry. The lower level includes rail facilities which would bring transcontinental freight shipside to the Bay's deep water harbor facilities.

The Bay Area Council's committee will be headed by Frank Belgrano, president of the Bank of America's Central Bank of Oakland and backed up by B. F. Modglin, president of Builders of the West and an official of MacDonald & Kahn, one of the original members of the Six Companies. Mr. Modglin estimates the cost of building a second bridge at \$80 million to \$90 million, a figure slightly higher than the cost of the existing "greatest bridge in the world."

BETHLEHEM STEEL last week launched two major developments in the policy of their Pacific Coast Div. One is a major program of expansion, and the other a liberalized program of public relations.

The company is installing a new 4000-ton monthly capacity openhearth furnace in Southern California, bringing the number of openhearths in the Slauson Ave. plant to four. Present facilities are for 10-in. ingots and the

new openhearth will turn out 18-in. sizes. The new installations, which will cost between \$7 million and \$8 million, include a 30-in. 3-high billet mill and a combination 8-in., 10-in., 12-in. bar mill. This will supplant the present 12-in. mill and extend the product range from 2½-in. rounds down to 0.207-in.

The complete project calls for three new buildings and additional warehouse space, and will provide a full line of wire rods; a wide range of rounds, squares, flats, angles, spring steel and reinforcing bars and special attention to the bright wire market.

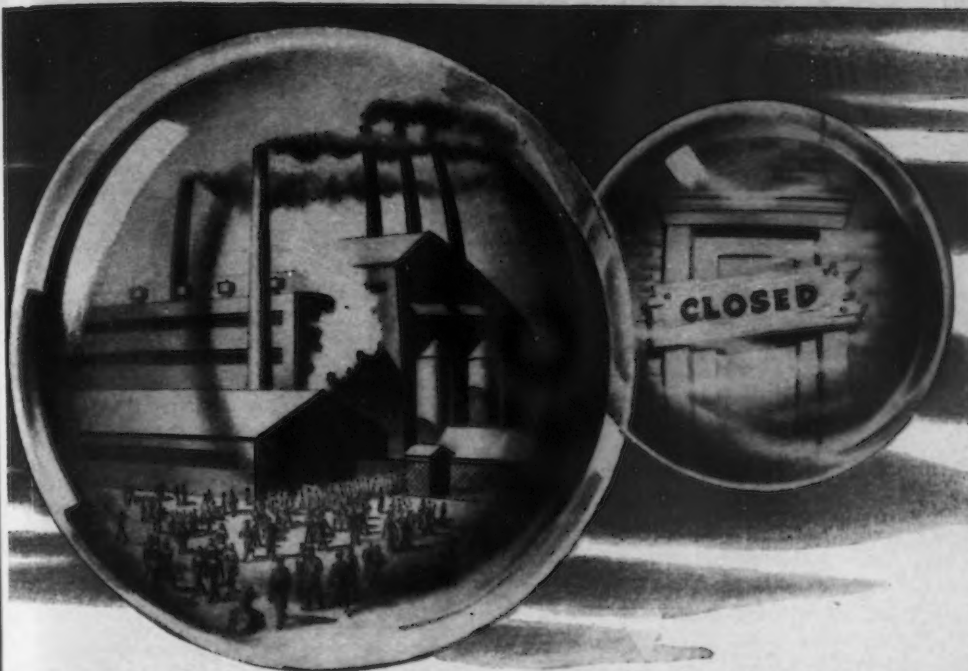
In a statement combining a judicious blend of candor and discretion, H. H. Fuller, Pacific Coast vice-president said, "This is the beginning of a definite, long-range program of expansion. We are in this market, we're going to stay in it, and we're going to grow with it. We're going to add to our facilities as the market demands. The detailed engineering is now in process and ground will be broken the first of the year."

"We don't intend to indulge in any flights of fancy; but under our new public relations policy we'll tell you what we're going to do when we're going to do it."

The statement was made at a luncheon and press conference following an inspection tour of the San Francisco plant during which top-flight Bethlehem officials answered any and all questions. The new public relations program is under the direction of W. S. Briscoe, recently transferred from Bethlehem's Baltimore plant.

Mr. Fuller gave the daily press a frank explanation of the reasons why Coast steel mills find it difficult to meet production costs of eastern mills. He described the necessity for constant changes in run, and attendant increased costs, required to supply the demands for small quantities of products but said that on high volume items such as carbon bars there is no reason why the West cannot approximate eastern mill costs.

The size of the potential postwar market on the Pacific Coast has been estimated at between 2 and 2½ million tons, and in Mr. Fuller's opinion will tend toward the lower figure. "A great deal will depend on the Asiatic market," he said. "Australia



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Don't gamble with the quality of your product . . . plan to use Ex-Cell-O precision production parts! With a complete organization under one responsible management . . . an organization built up of years of varied engineering experience, modern machine and manufacturing methods, and complete heat treat facilities, and practical assembling and inspection staffs . . . Ex-Cell-O probably has the exact solution to the parts production problem you face. Write today!

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To right: Typical of the many modern and complete production machines in the Ex-Cell-O Miscellaneous Precision Parts Division—facilities that are available for the production of accurate parts and sub-assemblies for your product—is this sectional view of single automatic screw machines.

EX-CELL-O CORPORATION, DETROIT 6, MICH.



EX-CELL-O's Precision Production Parts facilities:

PRODUCTION ENGINEERING

The Ex-Cell-O organization, with skill, facilities and modern methods that have made a wartime record, can make an important contribution in the planning of quantity production of quality parts and unit assemblies for your postwar product.

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- Multiple Vertical Turret Lathes
- Multiple Spindle Automatic Screw Machines
- Single Spindle Automatic Screw Machines
- Hand Screw Machines
- Engine Lathes
- Centerless O.D. Grinders
- Centerless I.D. Grinders
- Single and Multiple Spindle Drilling Equipment
- Form Grinding Machines
- Plain O.D. Grinders
- Plain I.D. Grinders
- Surface Grinders (Plain and Rotary)
- Milling Machines
- Thread Milling Machines
- Breaching Machines (Vertical and Horizontal)
- Precision Thread Grinders
- Thread Rolling Machines
- Precision Boring Machines
- Lapping Machines
- Special High Production Equipment

HEAT TREAT

- Induction Heat Treating
- Laboratory for Heat Treat Control including Micro Examination and Photography
- Atmosphere Control Continuous Hardening Furnaces
- Atmosphere Control Box Hardening Furnaces
- Various Types of Air-Draw Batch Type Furnaces
- Gas Carburize Furnaces
- Box Carburize Furnaces
- Push Anneal Furnaces
- Mixing Furnaces
- Cyanide, Lead, and Neutral Salt Pot Furnaces
- High Speed Steel Atmosphere Control Vertical and Horizontal Hardening Furnaces
- Continuous Air-Draw Furnaces
- Sub-Zero Heat Treating Equipment

UNIT ASSEMBLIES

For many years Ex-Cell-O has supplied large and small manufacturers with parts and has also supplied many parts in unit assemblies after machining, heat treating and grinding.

INSPECTION

Ex-Cell-O has always maintained that quality in a product is the result of accident; that quality is built into a product by rigid adherence to accepted quality standards . . . standards that are upheld at Ex-Cell-O by efficient inspection at every step of the machining process.



and India will furnish competition with their expanded facilities and Asia will also buy from our eastern mills. It is difficult to estimate what part of the sales the West will furnish until we determine the type of demand. And from the point of view of tonnage the West will show to disadvantage because of the East's capacity for producing the heavier items."

One interesting disclosure during the mill tour was that Bethlehem was buying pig iron from Fontana. Officials stated that they were also about to start buying from Geneva's sole remaining furnace, and that as a matter of policy they obtained their pig wherever they could buy it to the best advantage—Geneva, Fontana or Bethlehem.

Reiterating that Bethlehem would expand their facilities as the market warranted—and a clear implication that they would not be influenced by competitive expansions, Mr. Fuller also announced that their Seattle nut and bolt plant would be expanded to the tune of more than \$200,000. "When completed this addition will be of sufficient capacity to supply the needs of the entire western market," he said.

The last disclosure which Mr. Fuller made was that approval had been granted for the installation of a spectrographic laboratory at the South San Francisco plant, a facility heretofore lacking on the Coast.

* * *

ANSWERING recent comments about Willow Run plant, Verne Drum, general manager of Kaiser-

Frazer, says, "That plant has 'autos' written all over it. To the best of my knowledge it will be the only one in the industry where the entire operation from body press to tune-up is all under one roof and on one floor level. And it's not such a big plant either. It will enable us to utilize all but 25 pct of the floor space in our initial operations and will do a lot to simplify them. We have no problem of waste space as the excess will house possibly the foundry, but more probably the motor assembly plant."

Applications for distributorships and dealerships for the Kaiser car, which will be monocoque design (no chassis, the stress taken up through the whole structure) and the more traditional Frazer are coming in at an unprecedented rate. The company has received 9000 applications and accepted 3000. Average capitalization for each stands at \$50,000.

The Frazer car will be sold through distributors to dealers, and the Kaiser, direct to dealers with Frazer distributors given first choice. The company expects this procedure to afford a substantial reduction in sales costs, according to Charles Fennell.

* * * *

International Harvester is about to take back its Army plant at Emeryville and start manufacturing trucks. Several hundred men will be employed in the operation which will include fabricating and assembling special custom jobs of large size and is expected to take advantage of present independent western body and trailer-building facilities.

Plant sites are also being surveyed

in the Stockton-Sacramento district where the company intends to build a farm machinery factory to supply its western demand. This plant will extend the company's assembly and semi-fabrication operations in the area.

LOS ANGELES—Cyrus Eaton, steel financial expert, came to Fontana, saw, and departed—via Geneva—for Cleveland and a series of conferences to be held with Henry J. Kaiser in New York next month.

Mr. Eaton, who believes that only steel companies located in their markets make money, is reported to have been favorably impressed with the prospects for Fontana. He is said to have characterized it privately as "a plant with costs comparable to Eastern, and a price differential reflecting the distance of its competition from the market."

Publicly Mr. Eaton said, "There are three requirements for establishing a peacetime steel industry in California. Number one is good raw materials at low costs. I think you have that out here. The second is access to markets. You can have that, I believe. The third prerequisite is financial. Your local steel industry must be founded on a basis that will make it competitive with old established organizations farther east. The Fontana plant involved more than \$100 million of government money. If the government uses that as a basis of payment the plant cannot be operated economically as a peacetime industry. However, I feel that this matter will be dealt with realistically at Washington in due time—probably before the two-year period of grace. In the meantime Mr. Kaiser is going ahead with production."

Referring again to Fontana's proximity to the market, Mr. Eaton said that he was not so sure of Geneva's future but would have a clearer idea after his forthcoming visit.

Lands Oil Co. Contract

Boston

• • • Stone & Webster Engineering Corp. has a contract with the Standard Oil Co. of Indiana to design and construct at Whiting, Ind., a initial installation of a 10,000 kw high pressure topping turbine generator unit, and two steam boilers with a capacity of 300,000 lb of steam per hr at 1350 lb per sq in. Work is to be completed the last of next year.

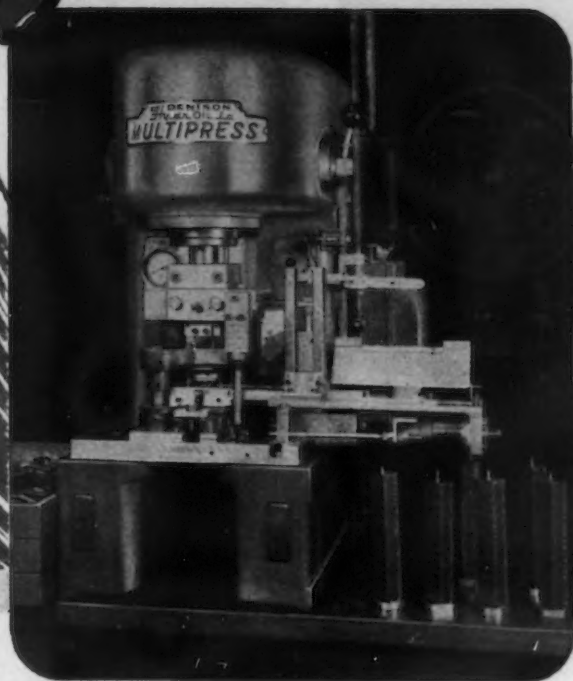
TOKYO TREASURE: U. S. Army authorities look over gold and silver bullion which is a part of the \$250,000,000 treasure uncovered in the Tokyo Imperial Mint.



MULTIPRESS SHAVES

Production Costs

for
GILLETTE



Higher Output on Precision Punching Operation

MULTIPRESS proves its advantages on another task . . . punching key slots in metal safety razor guards at the Gillette plant in South Boston. Performance records show reduced "downtime" for maintenance and tooling "setups" . . . thus, *higher* daily production. Reduction of noise is another important factor. And this completely self-contained, fully automatic, HydrOILic press occupies less space than previously used equipment. In this case, the user designed his own automatic feed device for the versatile MULTIPRESS . . . made easier by the unit's clean lines and smooth surfaces.

Built in 4, 6, and 8-ton capacities, MULTIPRESS is bringing similar production gains

and efficiency to scores of production jobs. Standard accessories, such as, straightening fixtures, extension tables, bolster plates, indexing tables and others are available for these manually controlled or automatic cycling units . . . plus the amazing new Vibratory Ram Action, which provides automatically-delivered, short ram strokes at frequencies up to 500 per minute, with each of those strokes exerting closely regulative, uniform pressure on the work! Even the number of those vibratory strokes per ram cycle may be controlled automatically. Write for details!

The DENISON Engineering Co.
1158 Dublin Rd., Columbus 16, Ohio



DENISON
EQUIPMENT - APPLIED
HydrOILic
OIL

PERSONALS

• **Lt. Col. John S. Tawresey** has been appointed vice-president in charge of engineering of the Bunting Brass & Bronze Co., Toledo, where he will direct research and study of modern bearing design and applications in the light of advancements made during the war, and the requirements of modern mechanisms in all fields.

• **James K. Sutherland**, veteran steel plant executive, has been named superintendent of the Ford Motor Co.'s rolling mills and open hearth at the Rouge plant. Since last spring he has been on special assignment with the War Dept. in Europe. **Robert F. Kohr** has joined the staff of the Ford automotive research engineering dept. and **A. E. Klemmedson**, former assistant manager of the Ford branch at Dallas and recently manager of the branch at Oklahoma City, has assumed the managership of the Dallas branch.

• **Charles H. Peirce** has been appointed sales manager of Edward Blake Co., Newton Center, Mass.

• **W. D. Heist**, for 30 years with the Alan Wood Steel Co., Norristown, Pa., in various executive capacities and for the past nine years purchasing agent for the company and its subsidiaries, resigned Oct. 9. Resignation becomes effective Nov. 15.

W. D. HEIST, purchasing agent, resigned, Alan Wood Steel Co.



G. G. LANDIS (left), vice-president in charge of engineering, and **H. F. KNEEN** (right), vice-president in charge of manufacturing, Lincoln Electric Co.



• **G. G. Landis** has been named vice-president in charge of engineering and **H. F. Kneen**, vice-president in charge of manufacturing, for the Lincoln Electric Co., Cleveland. Both men have served the firm for many years.

• **Michael Schwarz** and **Lt. Charles B. Homer** have been added to the executive staff of Bridgeport Brass Co., Bridgeport, Conn. Mr. Schwarz will serve as market adviser, and Mr. Homer as sales promotion manager.

• **W. H. Henry** has been appointed assistant manager of the Industrial Div. in charge of the motor business in the reorganization of the Motor Div. of General Electric Co.'s apparatus dept., Schenectady. The following division managers have been appointed: **A. W. Bartling**, manager Fractional-hp Motor Div.; **Elliott Harrington**, manager Induction Motor Div.; **J. T. Farrell**, manager D-C Motor Div.; and **P. A. McTerney**, manager Synchronous, Large D-C, and Gear-motor Div. **E. A. Green** returns to the motor organization as general assistant to Mr. Henry and **D. E. Moorhead** has been appointed assistant to Mr. Henry.

• **Charles L. Jacobson**, in charge of Chrysler Corp.'s war activities in the Evansville, Ind. plant, has been appointed assistant to the general manager in charge of subsidiary operations, with offices in Detroit.

• **Karl K. Probst**, Detroit consulting engineer and veteran in the auto industry, has been appointed chief engineer of Reo Motors, Inc., Detroit.

• **Elmer Lehmkuhl**, formerly associated with Propellair, Inc., and the Master Electric Co., Dayton, has been appointed sales manager of Dynamic Air Engineering, Inc., Los Angeles.

• **Myron L. Sisson** has been appointed superintendent of the Sunrise, Wyo., iron mine of Colorado Fuel & Iron Corp. He succeeds the late Harry A. Wright.

• **Thomas H. Langan** has joined the Janitrol sales dept. of Surface Combustion Corp., Toledo. He is assistant to the manager of the Cleveland district office.

• **Wallace L. Pond**, director of sales, Nicholson File Co., Providence, has retired after 50 years of service. **Harry L. Whitney** assumes his title and full responsibility for the company's domestic sales.

• **David S. Gendell, Jr.**, general manager of erection, Bethlehem Steel Co., Bethlehem, Pa., has retired after 45 years of continuous service with the organization. He will be succeeded by **J. H. Wagner**, now manager of erection in the New York district. **G. C. Lane** takes over Mr. Wagner's responsibilities in New York.

• **W. Dean Robinson**, vice-president and assistant general manager of Briggs Mfg. Co., Detroit, has been named president, succeeding **W. P. Brown**, resigned. **E. E. Lundberg**, vice-president in charge of engineering, succeeds to the duties of assistant general manager. **Charles T. Fisher**, Detroit banker, was elected to the Briggs board.

H. F.
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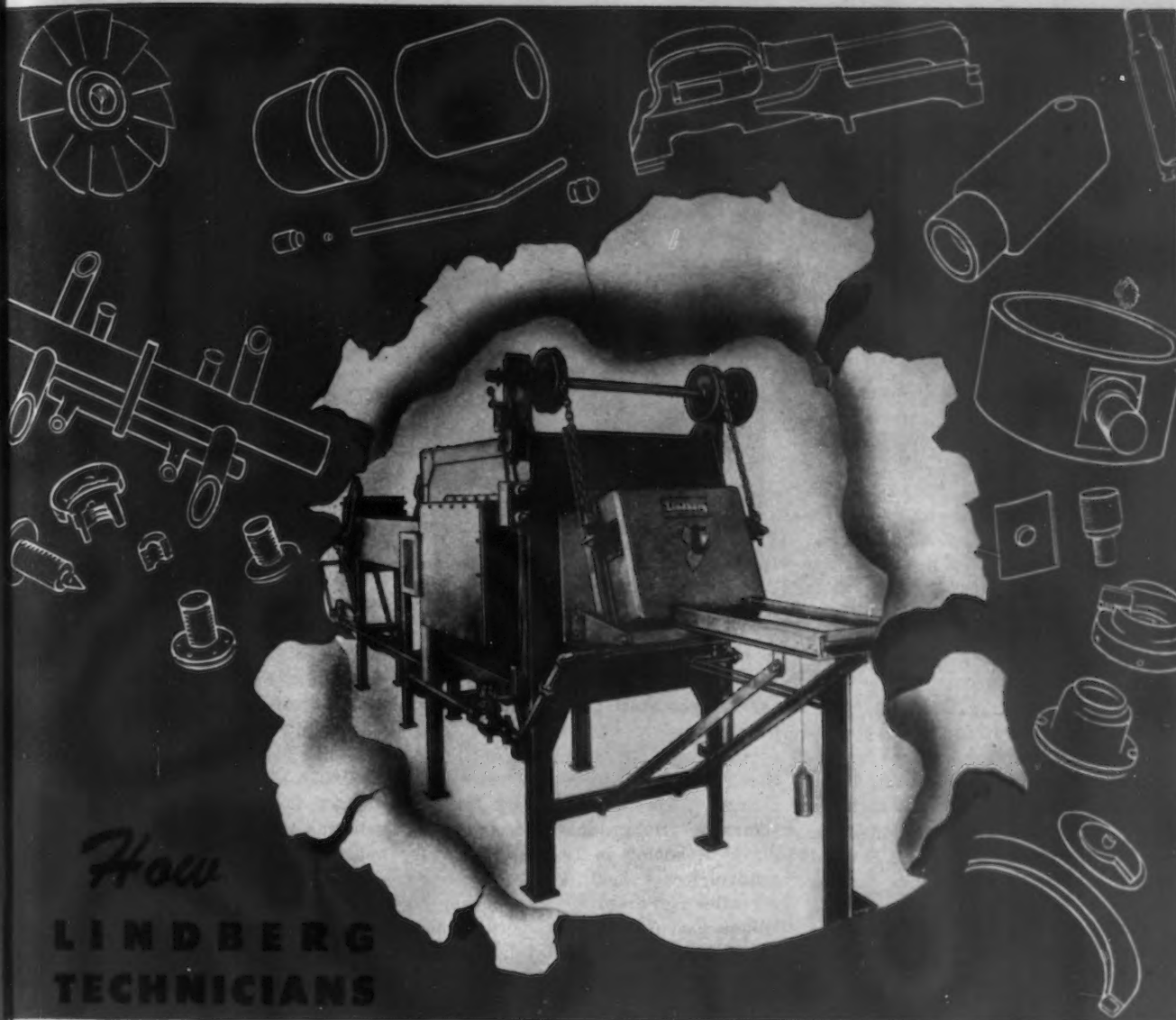
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How
**LINDBERG
TECHNICIANS**

CAN REDUCE YOUR COSTS WITH THIS PRODUCTION BRAZING FURNACE

The high-production efficiency of this versatile all-purpose Lindberg Brazing Furnace — plus the technical assistance of our able research staff — is helping many manufacturers reduce costs and speed reconversion.

The parts sketched above are typical of many being produced faster... better... cheaper by this basic improvement in production technique.

Your competitive position may be strengthened by having Lindberg technicians analyze your product and methods. Their findings may possibly uncover ways to replace slower, more expensive processes with fast, economical Lindberg Production Furnace Brazing.

This analysis leaves nothing to chance, costs you not a cent! Let our engineers explain the full benefits of using Lindberg Production Furnace Brazing. Your inquiry places you under no obligation. Write today!

LINDBERG ENGINEERING COMPANY
2452 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

LINDBERG

Furnaces

SUPER - CYCLONE • CYCLONE • HYDRYZING • BRAZING

• **Paul H. Shaeffer** has been appointed Cleveland district manager of the Vanadium Corp. of America.

• **John M. Martin** has been appointed manager of the Pittsburgh explosives office of Hercules Powder Co.

• **F. C. McMullen**, in charge of aviation radio sales for Western Electric Co., New York, has been appointed chairman of the aviation section of the Radio Manufacturers Association's Transmitter Div.

• **Frank A. Sunderland** has been appointed advertising and sales promotion manager of Edo Aircraft Corp., College Point, N. Y.

• **Clyde MacCornack** has rejoined the Phoenix Bridge Co., Phoenixville, Pa., in the position of vice-president and general manager.

• **Gustav S. Swanson** has been appointed sales manager of the Oscar W. Hedstrom Corp., Chicago.

• **Dr. E. B. Gunyou** has been appointed assistant to the manager of research and development dept. of Pennsylvania Salt Mfg. Co., Philadelphia. **Fred C. Abbott** has been appointed manager of the New Products Div. for the company.

• **Hugh Krampe** has been appointed general sales manager of Rodgers Hydraulic Inc., Minneapolis.

• **Warren J. Kilburn** has been appointed general manager of American Gear & Mfg. Co., Chicago. He is succeeded as sales manager, which post he had held since 1931, by **N. C. Schlegel**. Mr. Schlegel has been Chicago branch manager of the Boston Gear Works, Inc., since 1936, and prior to that time operated his own sales office in New York. **Charles S. Squyres** has been named foreign sales manager.

• **E. J. Fullam**, formerly vice-president of the Fellows Gear Shaper Co., Springfield, Vt., has been elected president. He succeeds the late **E. P. Fellows**, founder of the company. **E. W. Miller**, general manager, has been elected a vice-president, and **R. M. Fellows**, treasurer, has been also made a vice-president. **Mrs. E. R. Fellows** was elected a director to fill the vacancy left by her husband.

• **R. P. Tyler**, general sales manager of the Macwhyte Co., Kenosha, Wis., has been elected a member of the board of directors to fill a vacancy caused by the resignation of **Mrs. George S. Whyte**.



HOWARD V. CLARK, vice-president in charge of sales, Detroit Steel Corp.

• **Howard V. Clark** has been made vice-president in charge of sales of the Detroit Steel Corp., Detroit. Mr. Clark formerly was manager of sales of the Sheet Div. of Carnegie-Illinois Steel Corp. and in recent years had charge of special sales work for the company. He graduated from U. S. Naval Academy in 1920 and in subsequent years held positions involving sales and order work in Carnegie-Illinois except for a short period when he was associated with Inland Steel Corp. in sales work.

• **Lt. Col. Leroy E. Everett** has retired from active duty with the Army Air Forces and has joined **Lester B. Knight & Associates**, Chicago foundry engineers and consultants.

• **J. J. McCormick** has been appointed manager of the products development

laboratory, and **Dr. Edward G. Bobalek**, manager of the resin research dept. of the Arco Co., Cleveland.

• **Charles A. Reinbolt, Jr.** has joined the American Central Mfg. Corp., Connersville, Ind., as sales promotion manager.

• **Robert B. Ackerman** has been elected vice-president, and **E. B. Williams**, vice-president in charge of engineering of the American Shipbuilding Co., Cleveland.

• **George W. Flanagan**, formerly in charge of geon latex development, has been made manager of the B. F. Goodrich Chemical Co. development laboratory in Cleveland.

• **Capt. John D. Dale** has resumed his duties as vice-president and managing director of **Charles Hardy, Inc.**, New York.

• **John P. Faver** has been appointed assistant to general manager and consulting engineer of engineering dept., **Ransome Machinery Co.**, Dunellen, N. J., a subsidiary of the Worthington Pump & Machinery Corp. **J. E. Bushnell** was promoted to chief engineer, and **George W. Cronk** to chief draftsman.

• **C. H. Butts** has been appointed operating vice-president of the Sharon Steel Corp., Sharon Pa. Mr. Butts has been connected with the company the past 11 years, having served as assistant to the president, vice-president in charge of research and development and has been president of **Niles Rolling Mill**, Sharon subsidiary, since 1936, which position he still holds.

OBITUARY...

• **William I. Howland, Jr.**, 58, sales manager in Milwaukee for Carnegie-Illinois Steel Corp., died Oct. 16 in Pittsburgh. He was a former vice-president of Illinois Steel Co.

• **William N. Armel**, assistant traffic manager, International Harvester Co., Chicago, died Oct. 17. He had been associated with the company for 45 years.

• **Victor E. Flodin**, 74, former superintendent of the Chicago plant and former director of Crane Co., died Oct. 14. He had retired in 1938.

• **Kenneth F. Miller**, 40, sales manager of the A. L. Smith Iron Co., Chelsea, Mass., died recently.

• **Harry T. Bebb**, 61, president and general manager of Canton Stamping & Enameling Co., Canton, Ohio, died suddenly Oct. 18.

• **David W. McCord**, vice-president of McCord Corp., Detroit, died recently in Long Island, where funeral services were held.

• **Fred H. Lammert**, special representative of the Youngstown Sheet & Tube Co., connected with the Indianapolis district office for the past 10 years, died suddenly from a heart condition at Cleveland, on Oct. 21.

WORTH READING

..... THIS FACTUAL STORY ON **SIMANAL**

LADLE DEOXIDATION
in
STEEL PRODUCTION



SIMANAL

20% SILICON • 20% MANGANESE • 20% ALUMINUM

*Write Today
For Your Copy!*

Know the many advantages of Simanal applications to various steels. Every producer of iron and steel, both ingots and castings, will appreciate this authoritative report. Practical examples are shown with etched tests and cleanliness ratings.

FERRO-SILICON 50%, 75%, 85%, 90%

FERRO-CHROMIUM • FERRO-MANGANESE

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BRIQUETS

OFA SILICON, MANGANESE, CHROME



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*Ohio Ferro-Alloys Corporation
Canton, Ohio*

Chicago Detroit Pittsburgh San Francisco Tacoma

Dear Editor:

AUTOMOTIVE USE, SAE STEEL

Sir:

Are you in a position to give a rough idea of what the automobile companies' purchases of SAE steels will be? As you know, before the war they used appreciable quantities of SAE 3100 and 4800.

FRANK PARKER,
Chairman

Iron & Steel Products, Inc.,
Chicago 33

● You pose a most complicated question. The acceptability of the National Emergency lean alloy steels varies about as much as the metallurgists who have specified them during the war. A lot of the answer is inevitably bound up with cost. For instance I think a lot of NE 8600 steel, which sells for some \$13.00 extra per ton, will be used as a replacement for 4600 gear steel, where the extra is \$24.00. But even though 8600 has pretty well proved itself during the war, it is unlikely to substitute for 4100, whose extra is \$14.00 and \$15.00, and certainly not for a few of the 4000 series specifications, which are \$9.00 extra.

For the same reason I do not think 9400 NE steel will be very much used, because its extra price is \$15.00 per ton and 8600-8700 does most of the job for which 9400 can be used. There has been comparatively little investigation of the 9900 series, but it has substituted here and there for 4300 and 4800, and is priced lower.

Of course the leaner alloys require somewhat more heat-treating than the rich SAE grades, and this factor must be considered in any appraisal and will be by the factories before they make a final choice.

Another question indicated in your letter is the total tonnage of steel likely to be ordered by all the automobile companies. Before the war the average consumption of carbon steel was 2,863 lb and of alloy 287 lb. Of the carbon steel, I would guess that almost half was in sheet form; the balance in bars and other shapes. I think it likely that somewhere more than 500,000 automobiles will be built through the balance of this year, which would indicate a consumption up to Jan. 1 of about 700,000 tons of carbon and 75,000 tons of alloy.—Ed.

METALS & ALLOYS CHARTS

Sir:

Please send me tear sheets of the "Metals and Alloys Comparison Charts," which appeared in the Mar. 30, 1944 issue.

ED V. TAPP,
Quality Control Dept.
Radio Corp. of America,
Camden, N. J.

● Tear sheets have been mailed.—Ed.

GAGE CONTROL

Sir:

Please send a copy of the article, "Gage Control," by W. F. Johnson, from the Sept. 20 issue.

M. O. SOBEL,
Methods Engineering Dept.
Colt's Patent Fire Arms Mfg. Co.,
Hartford, Conn.

● Tear sheets have been mailed.—Ed.

ARC WELDING ELECTRODES

Sir:

Will you please send us a copy of your reprint of May 13, 1943, entitled "Comparable Arc Welding Electrodes." This is a comparison of arc welding electrodes for steel and stainless steel covering AWS specifications from 4510 to 8010, and AISI stainless grades from 301X to 502. We attach 15¢ in stamps.

M. C. WOODWORTH

Arcos Corp.,
Philadelphia 2

● Reprint has been mailed.—Ed.

STEEL TUBING WANTED

Sir:

It is difficult to locate manufacturers of steel tube that will take the place of the rerolled rail carbon tubing which we have been using. We are interested in sizes of the 1 in. to 2½ in., OD. This rail tubing was made at Bethlehem Steel Co.'s plant at Danville, Pa., formerly the Danville Structural Steel Co., which is now closed, and also at Elyria, Ohio. This latter plant was so far booked up with government orders that they say they will not be able to take care of their regular customers until next June. The demand for this tube is quite heavy, and we believe if you mention this, some of the smaller tube mills might be interested in going into the manufacture of this tube, either in railroad rails or steel of like quality.

A. M. McBRIDE,
Secretary

Newark Steel Post Co.,
W. Orange, N. J.

BOLT TESTING IMPORTANT

Sir:

The articles by A. S. Jameson, Aug. 23 and Aug. 30, on "Automotive Bolts" were read by our executives with a great deal of interest.

It is this kind of good, clear, scientific thinking that will enable the users of bolts and nuts to understand not only our problems, but the proper application for our product. We only wish that further articles of this type will receive wide circulation.

Our metallurgist has written an article for fasteners, discussing the method of testing. Although this article was written before Mr. Jameson's appeared, so many of the thoughts concur that it would almost seem that certain phrases were copied. Of course, this is to be expected when metallurgists think along similar channels.

This problem of testing bolts is very important, as many of our customers do not seem to understand how important a test can be. The test for ductility is especially important, and we are trying to think up

some method of arriving at a suitable ductility test. As a matter of fact, we feel that our industry should submit to ASTM, a standard test method. If Mr. Jameson has any thoughts on this matter, we would appreciate his help.

JOHN S. DAVEY,
Assistant General Manager of Sales
Russell, Burdall & Ward
Bolt and Nut Co.,
Port Chester, N. Y.

DRILLING TIME

Sir:

We would appreciate receiving a reprint of the article "Time Allowances for Multiple Spindle Drilling," which appeared in the May 31 issue.

A. G. LENNON

Crane Ltd.,
1170 Beaver Hall Square, Montreal

● Reprints are available at 15¢ a copy.—Ed.

GERMAN CARBIDE INDUSTRY

Sir:

We would appreciate receiving a copy of the article "German Cemented Carbide Industry" appearing in the Aug. 30 issue, and are enclosing 15¢ to cover the cost.

RICHARD P. SEELIG,
Chief Engineer
Powder Metallurgy Corp.,
Long Island City 1, N. Y.

● Reprint has been forwarded.—Ed.

STEEL BASING POINTS

Sir:

Will you please forward one or two copies of the article "ABC of Basing Point System," which appeared in the Oct. 4 issue.

D. E. MERRIMAN,
Purchasing Agent

Stanley Works,
New Britain, Conn.

● Tear sheets have been mailed.—Ed.

WEAR-RESISTANT FINISH

Sir:

We are confronted with the problem of securing a wear-resistant coating of a decided black color on steel. Noting the very black and wear-resistant coating on laboratory items, such as microscopes, we would appreciate any information that you might furnish us. The steel base is a 6130 alloy which contains approximately 1.00 Cr, 0.75 Mn, 0.12 V, and 0.25 C. It is this base that must be coated, but we are limited in doing this inasmuch as there is a layer of tungsten alloy along the edge and this shuts out the alkali containing treatments because of its solubility.

FRED J. KAIM,
Chief Engineer
Superior Plating & Rust Proofing Co.,
Minneapolis 14

● The black finish on laboratory items is generally either a baked synthetic coating or a black nickel plate. The baked synthetic has better wear resistance, but the black nickel plate has the advantage of leaving the dimensions practically unchanged. However, all these finishes can be applied by a good job electroplater or metal finisher.—Ed.

Another problem* solved by **WHEELABRATING**

* PROBLEM

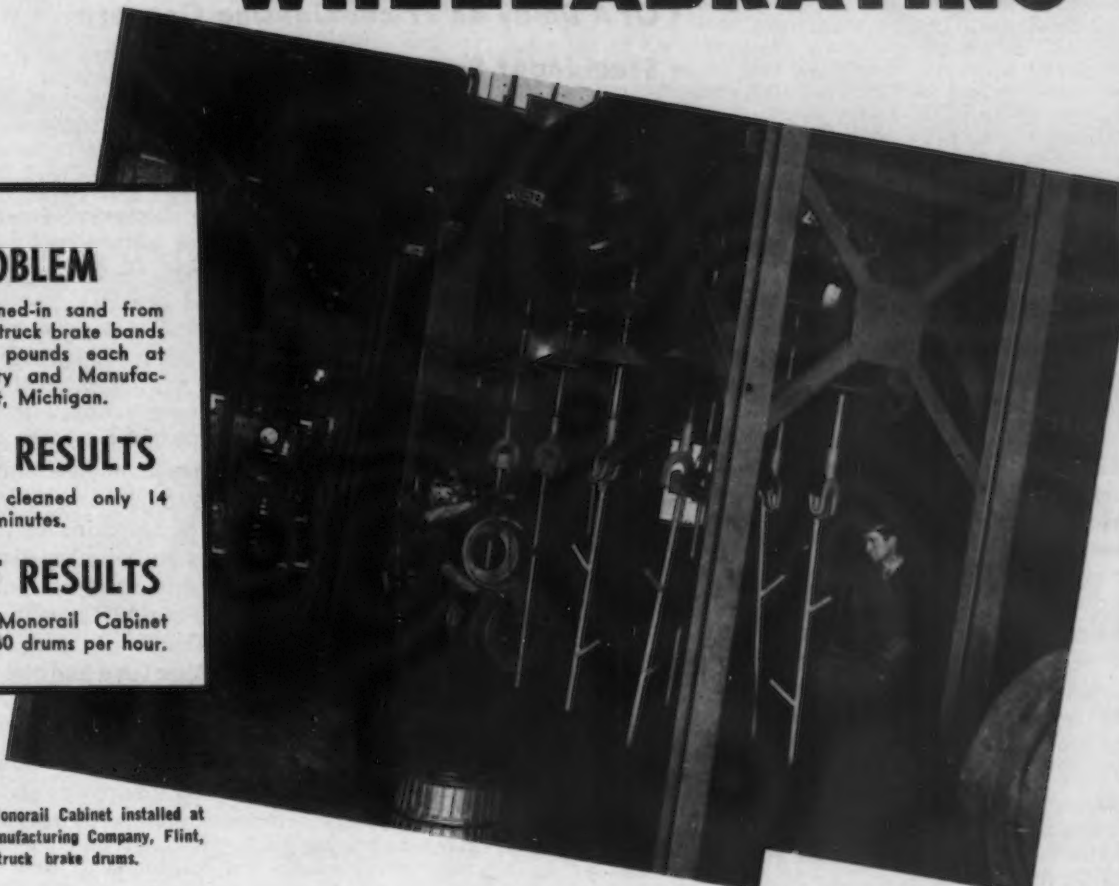
To remove burned-in sand from 18" Meehanite truck brake bands averaging 100 pounds each at General Foundry and Manufacturing Co., Flint, Michigan.

FORMER RESULTS

Tumbling mills cleaned only 14 castings in 50 minutes.

PRESENT RESULTS

Wheelabrator Monorail Cabinet cleans 120 to 160 drums per hour.



Above: Wheelabrator Monorail Cabinet installed at General Foundry and Manufacturing Company, Flint, Michigan, for cleaning truck brake drums.

THE ANSWER TO YOUR PROBLEM

The most efficient and economical way to handle your cleaning problem can be determined by sending products to our laboratory where equipment of all kinds is available for testing purposes. Avail yourself of this service today—doing so involves no obligation whatever.



THE ability of American to engineer and build blast cleaning equipment that will meet production requirements and show an attractive profit on the investment has been demonstrated in more than 2500 installations. If you have a troublesome cleaning problem our engineers will be glad to give you the benefit of their experience and recommendations in solving it the practical way. We invite a discussion of your problems with them at any time. Write today for "Wheelabrating—what it is and what it will do." Ask for Catalog 74.



WORLD'S LARGEST
BUILDERS OF
AIRLESS BLAST EQUIPMENT

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FOUNDRY
EQUIPMENT CO.
510 SOUTH BYRKIT ST.
MISHAWAKA, IND.

This Industrial Week . . .

- **Wage Shadow Boxing May Become Serious**
- **OPA Delay on Prices Causing Concern**
- **Steel Ingot Rate Up 7.5 Points**

THE current shadow-boxing between steel management and the steel union over the wage question is beginning to reflect an uncompromising attitude on the part of both. More serious, however, is the fact that the present controversy will develop into a realistic fight with the distinct possibility that after steel employee ballots are counted within a month or so, the steel industry may be paralyzed by its first general walkout for many years.

There continued this week to be high hopes that the government policy would finally become clear enough to forestall nationwide strikes in major industries such as steel and aluminum. Much is also expected of the impending management-labor conference. All this, however, may be wishful thinking as far as actually preventing an impasse in negotiations, the sum total at least in the steel industry would be to set back reconversion several months.

Already steel consumers have been hard hit by the reduction in steel production and shipments resulting from the recent coal strike. Most deliveries are so far extended and rolling mill schedules so far behind that it may take several weeks for steel companies to again make bona-fide delivery promises. By that time steelmakers may be running into labor difficulties of their own.

FAILURE of the OPA to announce expected steel price revisions has opened the industry to sharp criticism from customers for being unable to make either firm delivery or price commitments. Ordering normally is on the basis of prices in effect at the time of delivery, but with the latter in more or less of a chaotic condition consumers cannot have the benefit of reliable estimates until OPA takes action on steel prices.

Customers are finding it impossible to plan their own production schedules or to produce sound cost estimates on which to base their requests to OPA for possible price revision. Most manufacturers have become reconciled to extended deliveries and informal steel rationing, but engineering and construction projects are being seriously retarded by reluctance of contractors to make firm bids on a fixed price basis with specified completion dates. Such construction contracts as are being awarded are mostly on a cost plus basis with completions specified only "as soon as possible."

Fear of possible disruption of steel deliveries to the automobile industry in case of an automotive strike has been dispelled by notification of one of the big three to its steel suppliers that it will continue to accept steel deliveries even if the strike occurs—stock-

piling steel for resumption of production. The success of such a measure, however, depends upon the outcome of the steel-labor controversy.

Steel ingot output this week has rebounded 7.5 points to 74 pct of rated capacity, but is still almost 10 points below the post-V-J-day peak. Some blast furnaces are still down, but it is expected that by next week the operating rate will again advance. A tentative estimate of steel ingot tonnage lost during the coal strike approaches 800,000 tons.

The reduction in output of merchant pig iron as a result of the coal strike is having sharp market repercussions, with supplies becoming critical and with rumors of more stringent government distribution and inventory control. Many of the blast furnaces which were forced down by the coal strike may remain down for necessary repairs. Ordinarily such repairs might not have taken place at this time had the furnaces not been forced down.

Efforts of steel mills to increase the production of cold-reduced sheets vital to the automobile industry are being hampered by manpower shortages in the steel industry. Despite efforts to recruit additional help steel mills are still losing men.

ACTIVITY in the fabricated structural steel market was featured this week by the award of 7000 tons for a ball-bearing works at Sandusky, Ohio, awarded to Fort Pitt Bridge. American Bridge Co. was awarded more than 2500 tons of fabricated structural steel for the Tribune Square development at Chicago. Inquiries are headed by 11,000 tons for a sewer development in Chicago.

First segment of 500 or more locomotives expected to be placed by the French buying commission went to Baldwin Locomotive Works which has received orders for 160 locomotives for France. Pullman-Standard Railway, 300 50-ton box cars for Louisville & Nashville; 300 50-ton auto box cars for St. Louis & San Francisco; 19 passenger cars for Texas & Pacific and 28 passenger cars for the Missouri-Pacific. The Central of New Jersey is reported to have placed 5 4500-hp Diesel-electric freight locomotives with Baldwin Locomotive.

Despite the recent lower operating rate in the steel industry, scrap continues tight with prices at ceiling. The decline in the volume of pig iron production over the past few months due to repairs and strikes is contributing to an underlying factor of strength in a scrap market which might otherwise have reacted to the drop in scrap consumption during the decline in steel output.

• **PIG IRON RULING MIXUP**—Many persons have erroneously construed the recent action by WPB placing pig iron on the list of items subject to preference ratings as indicating that unrated orders for pig iron could no longer be placed and filled. This action, WPB officials emphasized, had no such effect but was merely intended to permit any person who otherwise qualifies under Priorities Regulation 28 to apply to WPB for a rating needed to obtain pig iron which is not obtainable on an unrated basis. Previously pig iron was subject to allocation control by WPB until discontinuance of that procedure put all pig iron orders on an unrated basis.

• **CONSTRUCTION AWARDS**—September bookings of fabricated structural steel for bridge and building construction, according to the American Institute of Steel Construction, Inc., totaled 136,998 tons. This compares with 92,684 tons for the preceding month and 51,133 tons for September 1944. September shipments for bridge and building construction were 53,686 tons as compared with 57,541 tons for the same month last year. The reported tonnage available for future fabrication at Sept. 30 has increased to 248,508 tons.

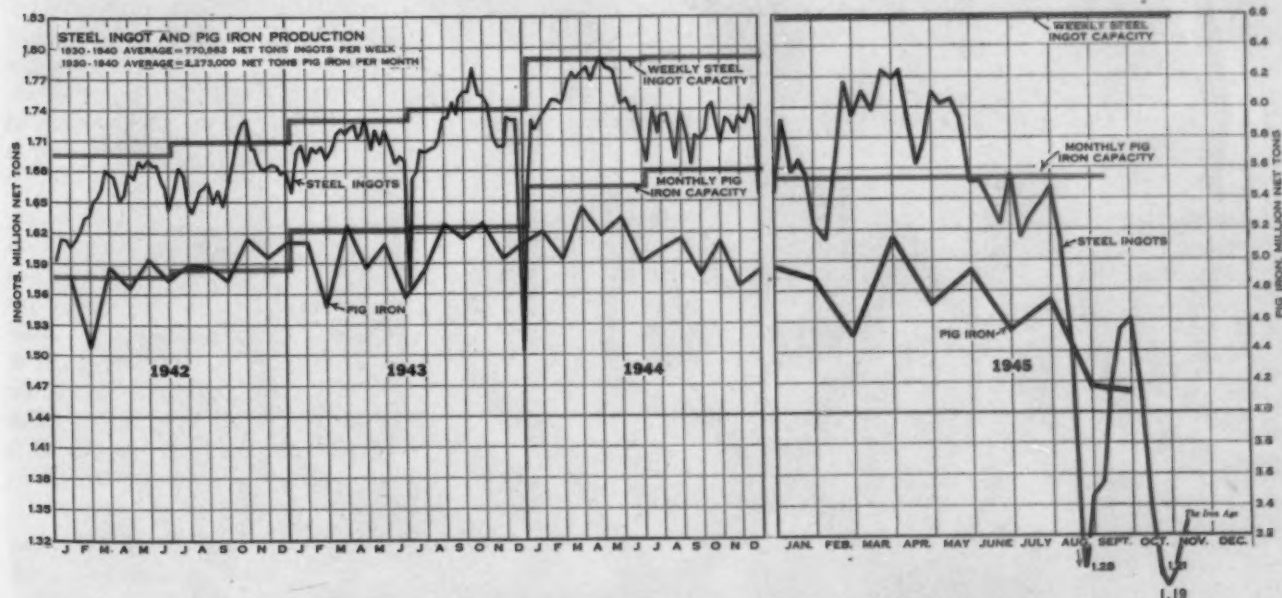
• **STEEL DIVIDENDS**—Dividend payments in the iron and steel industry during September amounted to \$28.9 million according to the Dept. of Commerce. This brought the third quarter total to \$50.3 million compared with \$50.4 million in the third quarter of 1944. It was also pointed out that \$392.4 million in publicly reported dividend payments during September brought the third quarter total for all industries to \$875.1 million which is fractionally less than in the third quarter 1944.

• **WORK WELL DONE**—Some 4500 veteran steel-makers who worked beyond retirement age to help U. S. Steel Corp. meet military needs during the war will have come to a well-earned rest by the end of the year. Experienced men of many skills made their contribution during the national emergency by staying on the job, or returned to work from retirement when manpower was a serious problem and more steel was required for the armed forces. They helped train thousands of newcomers in the war-busy steel industry, including many women.

• **COAL SHIPPING DOCK**—A contract for the construction of a new \$1,500,000 coal shipping dock at Lorain, Ohio, will soon be let by the Baltimore & Ohio Railroad, it was reported. The new dock, with a large car-a-minute coal dumping machine to load lake ships, will be constructed just west of the mouth of the Black River and adjacent to the company's ore unloading dock. The railroad already has a large switching yard that serves the present coal dumper located upstream in Black River. The project is expected to be completed in late 1946 or early 1947, when the new joint B.&O.-New York Central \$15,000,000 coal and ore dock at Toledo's lakefront is completed. The Toledo project will include three large coal dumpers and an unloading iron ore rig.

• **BLAST FURNACE DATA**—Active blast furnaces in the United States and Canada, normally supplied by the Lake Superior Iron Ore District numbered 148 Oct. 1 with 47 U. S. furnaces idle and 4 Canadian, making up the lowest monthly total since July 1940, according to the Lake Superior Iron Ore Assn. report. However, the number currently in operation is lower because of the coal strike. Rate of consumption during September was little changed from August with 5,837,017 tons of ore consumed in September compared with 5,658,278 tons in the preceding month. In 1944 September consumption totaled 6,950,255 tons. During the first three quarters of 1945 consumption of iron ore reached 58,373,871 tons compared with 69,954,182 tons in the same period of 1944. This decline in consumption has permitted some stockpiling for winter requirements at furnaces and on Lake Erie docks totaling 4,767,673 tons in September. Inventory totaled 39,549,055 tons on Oct. 1 compared with 41,943,299 tons on the same date of 1944. Dock stockpiles contain only 3,864,654 tons against 5,258,901 tons one year ago.

• **LOCOMOTIVE SURPLUS**—Almost all the American Army's steam locomotives in the European theatre—1667 of a total of about 2000—have been declared surplus and offered for sale for \$92,551,400, the Army-Navy Liquidation Commission has announced. A proportionate share of about 46,000 railroad cars brought into Europe by the American Army is expected to be put on sale soon. The remaining locomotives and cars will be used mainly in the American zone of Germany since the French railroads have already been returned to French civilian management.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
October 23.....	51.5	72.0	49.0	77.0	81.0	80.5	70.0	94.0	97.5	52.0	81.0	67.5	85.0	86.5
October 30.....	73.5	73.0	64.0	78.5	81.0	80.5	73.0	94.0	100.5	51.0	81.0	67.5	85.0	74.0

**TURNING A MESTA
SPECIAL ALLOY STEEL
STRUCTURAL MILL ROLL
USED IN PRODUCTION
OF 4 INCH CHANNELS.**

MESTA ROLLS



**MESTA MACHINE COMPANY
PITTSBURGH, PA.**



Strike Vote to Bring Steel Wage Question to a Head

Pittsburgh

• • • In effect, Philip Murray, CIO president, this week said "check" to the U. S. Steel Corp., and 765 other companies who have refused to grant the \$2 a day wage increase demanded by CIO. The "check" move by Murray was the filing of a petition for a strike vote among steel workers. The petition was filed by David McDonald, secretary-treasurer of CIO on Monday, Oct. 29, asking for a strike vote on Nov. 27, 1945. The petition was filed with the National Labor Relations Board, the War Labor Board and Secretary of Labor Lewis B. Schwellenbach.

The original petition involves 1042 CIO locals, 766 companies, about 645,000 steel workers, both union and non-union. It was estimated by Mr. Murray that before the vote actually takes place about 800 more locals and between 200,000 and 300,000 more people will be involved. This will be the largest single NLRB election ever to take place, outranking the miners vote of 425,000 by two to one and the 350,000 vote of the auto workers on Oct. 18 by nearly three to one.

The executive board of the CIO-USWA met on Saturday to consider the resolution of the wage policy committee which met on Friday. The wage policy committee had voted unanimously to authorize the executive officers of the CIO to take whatever action was deemed necessary, including strike votes, to win a \$2 a day general wage increase. The executive committee quite apparently had no other plan in mind than to ask for a strike vote election, since prior to the meeting Philip Murray indicated the certainty of this procedure by stating that a strike vote petition would be filed.

The CIO, which in this instance means Mr. Murray personally, intends to play this strike vote affair straight across the table, since Mr. Murray cautioned the union members against striking "at this time."

"It will be time enough," he said, "to consider using the strike weapon after votes are taken and the proper steps under the union constitution have been taken." The union constitution provides that no strikes shall be called without the approval of the international president and Mr. Murray asked that no premature strike action be taken.

By T. E. LLOYD

• • •

Members of the CIO employed as guards would be specifically exempt from strike votes in accordance with provisions of union contracts, Mr. Murray said.

The resolution adopted by the CIO policy committee giving full authority to the executive officers stated that the USWA request had been denied. "The pretext offered by the steel corporations is that their financial position is such that they cannot afford any wage increase without corresponding increases in the prices of their products. The stubborn facts reveal the arrogance of the position taken by the steel industry and the danger which it is creating for the nation."

The CIO claims that after granting a \$2 a day wage increase, the industry will still make upwards of \$400,000,000 in 1946, a figure that is based upon a \$300,000,000 tax refund from the government, \$125,000,000 annually as a result of the elimination of overtime pay and the return to a 40-hr

work week, and \$225,000,000 from the expected repeal of the excess profits tax law. From this total of \$650,000,000 the wage demands of \$225,000,000 would be deducted, leaving a profit for steel of about \$400,000,000.

One point overlooked by the CIO, however, is that the tax refund will be for a couple of years only and is a temporary relief to the steel industry. There is not much that can be questioned about the \$125,000,000 saved as a result of the return to the 40-hr workweek and the elimination of overtime, since the steel industry set this as the amount it cost them when steel went on the 48-hr week. As to the repeal of the excess profits tax, that is still problematical since the bill is yet in Congress.

Hiland G. Batcheller, president of Allegheny Ludlum Steel Corp., declared that it is time for "level headed thinking persons to take a more vocal and active part immediately in the nation's political life." Addressing members of the American Society for Metals, Pittsburgh Chapter, he referred to a recent publication issued by the CIO-USWA as "a masterpiece of misstatement and misapplication of

BALLOTS NOT BULLETS: Just as the G.M. employee ballots are being counted here, so will steel industrial employee ballots be counted soon. The application for the elections has been made to NLRB by Philip Murray head of USW. While both sides seem far apart, nonetheless negotiations will eventually be started again—a somewhat different situation from years gone by when both sides used cruder methods than the ballot box and the conference table.



figures, shot through with false and misleading conclusions, the implications of which threaten the real foundations of American prosperity."

The booklet referred to claims that the steel industry can increase wages of workers \$2 a day out of alleged "swollen war profits," tax rebates and money set aside to keep plants and machinery modernized. According to Mr. Batcheller, "The unions are saying in effect, 'we want air condition-

ing. Let's tear down the house to get it.'"

An Official of the U. S. Steel Corp., stated that the petition for a strike vote had been expected and indicated that corporation subsidiaries would sit tight and await its outcome. Certain policies, such as workers rights during the strike vote, would be outlined by the companies and issued to the workers. Aside from that, however, no other action was planned.

Bethlehem Turns Down \$2 a Day CIO Demand

Philadelphia

• • • Bethlehem Steel Co. has rejected the demand of the USWA for a general wage increase of \$2 per day or 25¢ per hr. The company presented to the union the following summary of its reasons for rejecting the demand:

Further increases in the already high wage rates of the employees in the company's steel plants could not be granted without substantial increases in the prices of steel products. Moreover, the company believes that a general wage increase would have inflationary effects which would be harmful to the national economy and

would threaten the standard of living of the nation.

"Wage rates in the steel plants of the company are now at the highest levels in its history. Since January 1939, the average straight time hourly earnings (without including overtime premiums) of the hourly paid employees in the company's steel plants have increased by over 39 pct. The wage increase demanded by the union would increase those earnings to a level more than 70 pct over the January 1939, level.

"The union's demand for a straight time increase of 25¢ per hr would mean an increase of 37½¢ per hour for all hours worked in excess of 40 hr per week. Actually a large per-

centage of the employees at Bethlehem's steel plants are now working 48 hr per week. The granting of the demand would mean that they would receive on the average the equivalent of 64 hr pay at present rates for 48 hr work per week in peacetime, as compared with 52 hr pay which they received for the same amount of work during the war.

"The estimated increase in the labor costs of Bethlehem's steel producing and manufacturing operations which would result from the granting of the union's demand for a general wage increase of 25¢ per hr is \$50,000,000 per year. It is evident that Bethlehem cannot absorb that additional cost. Moreover, the granting of such a general wage increase in the steel industry would inevitably be accompanied by similar wage increases in other industries and Bethlehem's costs of production would be still further increased by increased prices for the raw materials, supplies and services which it must purchase.

CIO Again Loses Vote At Thompson Products

Cleveland

• • • Another beating was handed "outside unions" in their third attempt to win the right to represent Thompson Products, Inc., employees in collective bargaining. By a margin of almost two to one the company's employees voted against the UAW-CIO and the UAW-AFL.

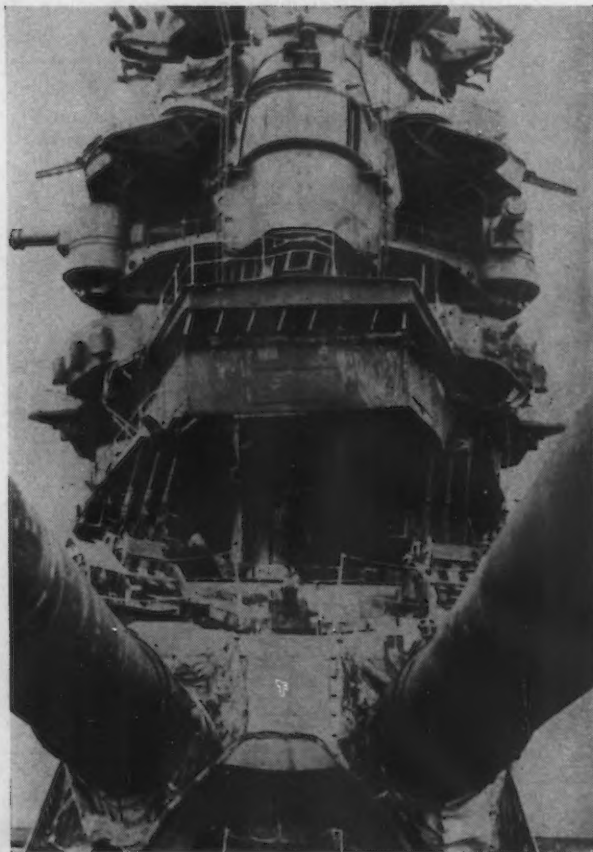
Ballots cast in the election conducted by the National Labor Relations Board were tallied as follows, according to Walter E. Taag, regional NLRB director:

CREDIT U. S.
BOMBERS:
The towering superstructure, lying off Yokosuka Naval Base, of the once great Japanese Battleship Nagato testifies to the skill and accuracy of U. S. bombardiers and the power of our bombs.

For UAW-CIO	929
For UAW-AFL	55
For neither union	1707
Challenged ballots	185
Void ballots	8

Thus, almost 60 pct of the 2884 votes cast were against representation by the UAW unions.

Frederick C. Crawford, Thompson president, who led the company's third successful battle against CIO and AFL unions, appeared before his workers at a series of rallies earlier in the week after the U. S. Circuit Court of Appeals in Cincinnati refused to grant an injunction sought by the NLRB, which would have restrained him from discussing the bargaining election. At one stage of the campaign, Mr. Crawford appeared before his employees carrying a striped prisoner's shirt with the No. 13 on the back.



Announces Labor-Management Conference Agenda

Washington

• • • Stipulating a minimum of seven points of labor-management disagreement upon which policies should be set, the agenda for the National Labor-Management Conference has been made public.

The points recommended by the Committee of Principals which consist of Eric Johnston, president of the U. S. Chamber of Commerce; Ira Mosher, president of the National Assn. of Manufacturers; William Green, president of the American Federation of Labor; and Philip Murray, head of the Congress of Industrial Organizations, were as follows:

1. The extent to which industrial disputes can be minimized by full and genuine acceptance by management of collective bargaining in every instance where workers choose to organize to bargain collectively on questions of wages, hours and working conditions.

2. The extent to which industrial disputes can be minimized by full and genuine acceptance by organized labor of the inherent right and responsibilities of management to direct the operation of an enterprise.

3. The extent to which industrial disputes can be minimized by the willingness of management and workers to utilize the machinery of the National Labor Relations Act and any existing state labor relations acts for prompt determination of the collective bargaining agencies.

4. The extent to which industrial disputes can be minimized by recognized and orderly procedures to negotiate first contracts between a union and an employer, and the extent to which provision should be made for the use of conciliation, if negotiations seem to be breaking down.

5. The extent to which industrial disputes can be minimized by provisions incorporated in collective bargaining agreements, such as:

a) The procedure to be followed in (1) the adjustment of disputes and grievances during the life of a contract; and (2) the negotiation of a succeeding contract.

b) The policy that once an agreement has been signed, no

strikes or lock-outs shall take place while it is in force, but that disputes shall be settled between the parties by other means provided in the contract.

c) When negotiations between the parties concerning the terms of renewal of a contract have failed, provision should be made for the early use of conciliation, mediation, and, where necessary, voluntary arbitration.

d) Provision by management and labor of facilities and personnel to enable grievances to be settled quickly at the level where they occur.

e) Adherence by both parties to a policy of responsibility for living up to the letter and spirit of all collective agreements and effective measures to carry it out.

f) Consideration of action needed by unions to control their members for conduct in violation of an agreement, and action needed by management to control their officials and supervisory force who engage in violation of an agreement.

6. To prevent industrial disputes from taking place, should provision be made for improving and strengthening the Conciliation Ser-

vice of the U. S. Dept. of Labor, and should there be additional support for the operation of this Service?

7. What provision should be made for lessening or preventing strikes which come from jurisdictional or other inter-union disputes?

In view of the strong possibility that such highly controversial topics such as wages, full employment and labor legislation would jeopardize discussions at the outset, the Committee in its letter of transmittal stated, "The Conference will accomplish more constructive results if it confines itself primarily to some of the major causes of industrial strife and the methods of reaching them." The CIO had strongly urged that these matters be given consideration by the Conference.

The Committee, however, emphasized that there is no thought of limiting the subjects of the discussion at the conference, pointing out that the more controversial topics are of vital importance to industrial peace. That there may be a different approach to industrial relations in the field of vital public utilities is fully recognized, the letter stated.

The agenda proposes to set up an Executive Committee of eight mem-

• • •
**SUBMARINE
 THREAT:** *Seamen load deadly missiles in the hedgehog—a secret anti-submarine weapon with which U. S. Navy ships projected explosives into the path of U-Boat packs during the war.*
 • • •



bers and a non-voting chairman, a Rules Committee of four members and also six committees which will deal with collective bargaining, management's right to manage, representation and jurisdictional questions, conciliation services, initial collective agreements and existing collective agreements. Alternates are eligible to serve with delegates on these committees and shall have full voting rights.

The conference membership will consist of 18 delegates representing management, 18 representing labor and 3 representing the public.

The 18 labor representatives were selected as follows: eight by the AFL; eight by the CIO; one by the UMW and one by the Railroad Brotherhoods.

The three public members are Judge Walter P. Stacy of Wilmington, N. C. and the Secretaries of Labor and Commerce. They are not afforded a vote in the conference.

Representatives of employers and management were selected in equal numbers by the U. S. Chamber of Commerce and the National Association of Manufacturers.

Representatives of management from the steel industry are Charles R. Hook, president of The American Rolling Mill Co., who will serve as principal and John A. Stephens, vice-president United States Steel Corp. as alternate (IRON AGE, Oct. 25, Page 99).

Other principal delegates for management include Otto A. Seyferth, president of the West Michigan Steel Foundry Co; Muskegon, Mich.; H. W. Steinkraus, president of the Bridgeport Brass Co., Bridgeport, Conn.; M. W. Clement, president of the Pennsylvania R. R., Philadelphia; George H. Love, Consolidated Coal Co., Pittsburgh; Ira Mosher, president of the Russell Harrington Cutlery Co., Southbridge, Mass.; Louis Ruthenburg, president of Serval, Inc., Evansville, Ind.; Charles E. Wilson, president of the General Motors Corp., Detroit; Charles E. Wilson, president of the General Electric Corp., Schenectady and Harry Woodhead, president of the Consolidated Vultee Aircraft Corp., San Diego, Calif.

Alternate delegates include M. M. Anderson, vice-president of the Aluminum Co. of America; Noah Dietrich, vice-president of the Hughes Tool Co., Houston; W. J. Grede, president of the Grede Foundries, Milwaukee; H. D. Hailey, secretary of the Washington Metal Trades, Inc., Seattle;

Lee H. Hill, vice-president of the McGraw-Hill Publishing Co., New York; W. M. Ringer, president of the Foley Mfg. Co., Minneapolis; Clarence O. Skinner, Automotive and Aviation Parts Manufacturers, Washington, D. C.; and W. H. Winans, Industrial Relations Manager, Union Carbide & Carbon Co., New York.

William Green, president of the AFL, and Philip Murray, president of CIO, will head their respective delegations. Clinton Golden, assistant to the president of the United Steelworkers of America, Pittsburgh, will serve as an alternate labor delegate. John L. Lewis will head the UMW delegation.

Seeks to Establish Seniority Procedure

Detroit

• • • Carboly Co., Inc., has filed suit in Federal Court here to determine the proper procedure to follow in rehiring veterans entitled to jobs under the Selective Service Act.

The action sets forth that Floyd J. Vaillencourt, an ex-service man, was rehired on Jan. 2, 1945, after being discharged from military service. He was put back on his old job.

During recent layoffs the company retained Vaillencourt, following the Hershey interpretations of the Selective Service Act, and laid off Mrs. Nellie L. Iannucci, an employee who

The working procedure of the conference, as set forth by the agenda, provides "In order to make any recommendation adopted by the conference reflect the overwhelming opinion withing both the labor group and the employer-management group, it is recommended that the assent of at least 15 members of each group be required for the adoption of any such recommendation." This rule, in effect, would neutralize the votes of the United Mine Workers and Railway Brotherhoods representatives in the event the AFL and CIO delegations split evenly. In other words, a simple majority would not pass a resolution.

had been hired in 1943 one day earlier than Vaillencourt.

This action having been taken, Local 771 of the CIO-United Auto Workers Union registered protest, claiming that its contract provided that Mrs. Iannucci should have been retained until all other employees of less seniority had been laid off. The suit, directed against the UAW, and Selective Service officials seeks to establish which set of regulations to follow.

Veterans' superseniority cropped up again in a settlement reached last week at the Detroit plant of Alcoa. The strike started when non-veterans were laid off ahead of veterans, with the company following the Hershey interpretations.

FINAL ASSEMBLY: A motorcycle enthusiast who had been in the Army in Germany has finally received his German motor, via three parcel post packages and \$8.86 mailing charges.



Mine Foremen Union Case Decision to Be Handed Down Soon

Washington

• • • Hearings before the National Labor Relations Board on petition by the United Clerical, Technical and Supervisory Employees of UMW for certification as representatives of the supervisory employees in captive coal mines owned by the Jones & Laughlin Steel Corp., were concluded Oct. 24. Decision is expected to be handed down around Nov. 15.

The recognition for collective bargaining purposes of a foreman's and supervisory employee's union affiliated with a rank and file organization, was the issue which precipitated the recent 26-day coal strike.

Counsel for the company contended that the employees involved performed managerial functions and to recognize them as members of the union would serve to split their interests between management and labor. The pledge taken by the union membership "to obtain highest possible wages," it was argued, would prevent efficient operation of the mines to the best interests of management.

The union contended that assistant foremen, technical workers and other supervisory personnel involved did not actually have independent managerial responsibility and that the question of affiliation with UMW was entirely beside the point. Pointing out that

there is no evidence indicating that rank and file employees have interfered with the discharge of supervisory employees' duties, union counsel stated that companies appear to have reached the conclusion that unionization of foremen would destroy loyalty to the management.

Consensus here as to the decision in the case is that Chairman Paul M. Herzog will cast the deciding vote. Since his appointment to the Board, he has not had the opportunity to decide on the matter of foremen's organizations. Member G. D. Reilly has consistently voted against recognition of foremen's unions. The third

member of NLRB, John M. Houston, has in previous decisions indicated that he favors collective bargaining by such organizations.

Upon conclusion of the recent coal strike, John L. Lewis indicated that further steps to settle the controversy would be taken at a later date. In the event that the board decides against recognition, some quarters expect that a strike or a threat of a strike will be forthcoming at a later date. Other sources believe the question may be handled by Mr. Lewis when union coal contracts come up for review next March.

Wage Raise Rejected; Discusses Employer- Employee Relations

Youngstown, Ohio

• • • Youngstown Sheet & Tube Co. cannot meet union demands for a \$2 daily wage increase, J. C. Argetsinger, vice-president and general counsel of the company, told union representatives at a meeting here recently.

In a letter outlining the company's stand on wage demands, addressed to the United Steel Workers of America, Mr. Argetsinger stated that if any part of the union's present demands were granted, the company would be compelled to seek price advances in

addition to those already requested, and pending, with OPA.

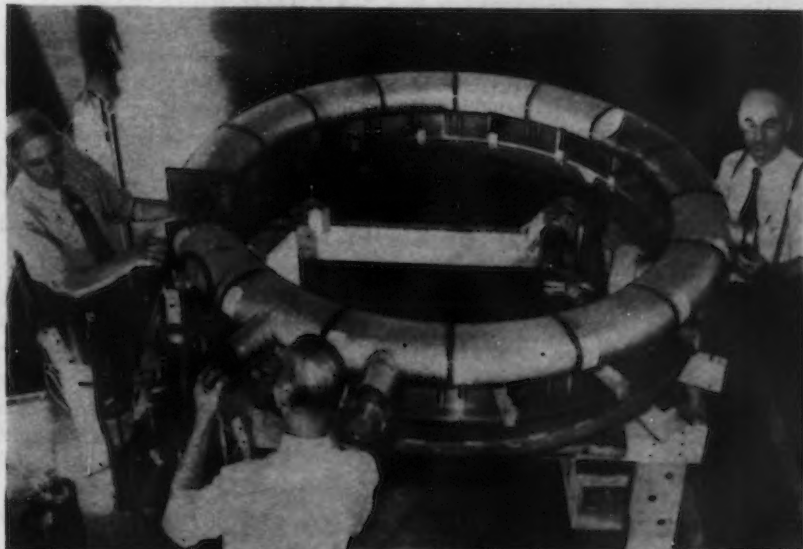
Putting Youngstown Sheet & Tube's stand on postwar labor relations squarely before union members, Mr. Argetsinger pointed out that any adjustment of wages must take into account the efficiency and productivity of the working forces.

"We find that efficiency and productivity have declined during the war period. A prosperous industry and continuous employment must be based upon a willingness to render a full day's work for a full day's pay. In my opinion your union must accept the responsibility and the obligation to require from its members a realization of and respect for their contractual obligations.

"All employees have a duty to work efficiently and honestly, to give a full hour's work for an hour's pay, and otherwise to increase production and to improve quality. The employer must not be restricted in his rights to control his operations and to take proper disciplinary action in cases of infractions of efficiency regulations.

"Today the employer expects to be held to any agreement he may sign, but a group of employees by walkouts or refusals to work may and do violate or breach with impunity the provisions of the agreement which they have signed, and the union protects such employees against disciplinary action. This attitude, I think, is one of the causes of friction between the union and the company. It enters largely into the matter of production and profits; it is an integral part of the matter of wages, and it must be considered in any future discussion of the wage problem."

ELECTRON ACCELERATOR: This huge electromagnet—housed in a special building with 3 ft concrete walls—can produce X rays of 100 million v. The machine, developed by General Electric Co., Schenectady, is made up of more than 100,000 thin pieces of silicon fastened together with a special cement. Photo shows assembling of the vacuum tube.



Foreign Rolling Stock Disposal Not Promising

Washington

• • • Because the majority of the equipment is wide or narrow gage, originally designed for foreign use, little, if any, of the \$23 million worth of railroad locomotives and cars which the Army has declared surplus will be wanted by domestic carriers. Even if otherwise usable, railroad interests stated that refitting the equipment with standard gage trucks would be almost as expensive as the cost of newly built standard locomotives and cars. At RFC, the disposal agency, no answer was given to the question of how it would market the equipment, which consists of 210 locomotives, 435 flat cars, 1530 box cars, 555 tank cars, 20 caboose cars and 360 gondola cars.

Truman Confers With Fairless and Snyder

Washington

• • • President Truman's unannounced conference on Oct. 29 with President Benjamin F. Fairless of the U. S. Steel Corp., one of a series to be held with industry and organized labor leaders, is believed to have been designed to forestall the wave of threatened strikes and to smooth the way for the labor-management meeting here on Nov. 5. Participating in the conference between President Truman and Mr. Fairless was John B. Snyder, OWMR Director. It is reported that Mr. Fairless has gone to the White House to confer with Mr. Snyder but was summoned by President Truman to discuss the labor situation.

The President was in conference with the head of the U. S. Steel Corp. at a time that the CIO-USW through Secretary-Treasurer David J. McDonald was filing a petition with NLRB for a strike vote in the steel, iron ore and aluminum industries. At CIO headquarters it was stated that USW has contracts with 769 companies in these industries but that the strike vote which, unless called off in the meantime, is to be held Nov. 29 will not involve all of the companies. It would, CIO headquarters said, involve 583,727 workers.

The White House conferences, it was hoped, would prevent strikes in these and other industries, including the automobile industry through a

Peacetime Steel Rate Significant

New York

• • • Steel operations at the rate of 70 pct of capacity now would result in considerably more tonnage over a year's time than 88 pct operations did in 1929, although costs would be greater according to the American Iron and Steel Institute reported recently. The difference results from wartime expansion.

In 1929 the industry produced 63,000,000 tons of ingots, operating at 88.5 pct of capacity. But 70 pct of operations for a year, based on current capacity, would produce 66,500,000 tons.

One quarter of the steel industry's present annual capacity would supply steel for: 5,000,000 autos; 900,000 trucks; 4,000,000 refrigerators; 3,000,000 washing machines; 5,000,000 vacuum cleaners; 4,000,000 electric toasters; 15,000,000 radios; 3,000,000 domestic furnaces and 900,000 dwelling units.

In addition to the above, the industry in the same year could supply 10,000,000 tons of steel for the railroads; 8,000,000 tons for construction other than dwellings; 2,000,000 tons for farm machinery; 3,500,000 tons for barrels, cans and other containers; 1,000,000 tons for machinery and tools; 2,000,000 tons for the oil, gas and mining industries—and still there would be around one-fifth of total annual steel capacity left for other purposes.

compromise. The compromise, it is reported, would provide for wage increases, together with moderate price increases, with the understanding that the agreement would not be followed by further demands for either wage or price boosts. One estimate was that wages would be boosted as much as 23 pct compared with labor's demand for a 30 pct increase. In such an eventuality the increase in the average hourly wage rate in the steel industry would be raised to about \$1.40 from the present rate of approximately \$1.14.

Both industry and labor leaders who conferred with the President prior to delivery of his wage-price policy on Tuesday night of this week are said to have been acquainted with its contents prior to its delivery.

Titusville Established Stainless Basing Point

Pittsburgh

• • • Effective Oct. 22, Universal-Cyclops Steel Corp. established Titusville, Pa., as a basing point for stainless forging billets and hot rolled bars. These are the only stainless products produced at the company's Titusville plant.

Since the Bridgeville, Pa., plant is within the Pittsburgh switching zone, Universal-Cyclops will continue to use Pittsburgh as the basing point for ingots, blooms, billets, slabs, sheet bar, plates, sheets, hot rolled bar, cold finished bar, wire rod, cold drawn wire, hot rolled strip and cold rolled strip, which represent the stainless products produced at the Bridgeville plant.

Purchases Patent Rights

Cleveland

• • • Hiram S. Rivitz, president of Industrial Rayon Corp., announced recently that patents on the company's continuous process for the manufacture of viscose rayon yarn had been purchased by the British company, Courtaulds, Ltd., of London. Mr. Rivitz did not give any details on the purchase price, but it is believed the transaction will amount to several millions of dollars.

Courtaulds, with a capitalization of more than \$128,000,000 has 14 factories in the British Isles and holds an interest in 10 companies engaged in textiles and other fields. For the first time Industrial Rayon's process will be made available to foreign countries.

Jeeps Arrive in Canada

Toronto

• • • Three Willys commercial farm jeeps have arrived in Canada from the United States for experimental purposes. Already some discussion is underway regarding the status of the jeep for tariff purposes. One of the questions asked is "What is the cost?" The answer is if the jeep is a truck the cost will be \$1800, and if a farm implement \$1200.

Apparently the government's present ruling is that the jeep is a truck and therefore must pay truck tariff rates when imported into Canada. So long as this ruling stands, the price of a jeep in Canada looks high, if not prohibitive to the Canadian farmers. No jeeps were made in Canada during the war, all those in use in this country by the armed forces were imported from the United States.

Czechoslovakian Industry to Be Nationalized

London

• • • Nationalization of all heavy industry in Czechoslovakia is authorized by the signature of new decrees by President Edouard Benes (to be signed in week of Oct. 22) covering 75 pct of the nation's industry. Mining operations, power plants, and commercial banks are among those groups of industries also affected. Although his signature makes these decrees law, they are being discussed by the Provisional National Assembly in its first session.

The experiment is probably the most venturesome undertaken by any government in commercial operation since the Russian revolution. The principle of nationalization was ac-

cepted when the provisional Czech government left its exile here last spring.

Owners will probably be compensated for their shareholdings according to today's valuation of the businesses involved. This is expected to apply both for shareholders in the country and outside. The 25 pct of the nation's economy that will remain outside the sphere of government operation will be small shops and private firms of modest size.

The program of nationalization is the first step in an ambitious program planned by the government of Czechoslovakia to rid its plants of Nazi-tainted managements, and the whole economy of German inspired inflation.

maintenance and \$15,000,000 for equipment, but does not include the purchase of new equipment which is provided for elsewhere. This new equipment will be largely passenger rolling stock. Most of the old rolling stock will undergo a modernizing process and the work will be done gradually.

Steel Buying Active In Canadian Market

Toronto

• • • New buying for first quarter delivery continues in heavy volume in the Canadian steel markets with many consumers placing orders in the hope of getting delivery rather than as a protection against any possible price advance. Demand for the past few days has centered largely on sheets and bars.

On sheets some producers now report books filled for first quarter delivery, while others still have unfilled capacity for this period. Orders are not being accepted into second quarter. Galvanized sheets have been experiencing very heavy call in the past few weeks. On both black and galvanized sheets producers are fully booked for this year and deliveries are not sufficient to meet consumer demand.

Increasing bar demand takes in all sizes, with the heaviest sales reported in carbon bars. Fresh bookings now extend to the end of February with some orders calling for delivery in March. Barmakers are filled on production for this year. Alloy bars have shown minor slackening in demand, but a steady volume of orders is reported.

Demand for steel plate is slow due to sharp curtailment in buying by the shipbuilding industry. However, some big orders have been placed by car and locomotive builders and more interest is developing from the building trades for plate. Structural shapes have been showing increasing demand lately and Canadian producers are fully booked to the end of the year.

Fabricators also are slipping behind on deliveries and more difficulty is reported in obtaining deliveries from the United States for fabricating in this country. Uncertainty with regard to delivery of various steel materials continues to hold up civilian production schedules, but there has been noticeable improvement in supply of consumer goods appearing on the market in the past two or three weeks.

British Shipbuilders Get French Contracts

London

• • • French orders for five large passenger and cargo liners have been placed with British shipyards on the Tyne River, although nearly all of the berths there are presently occupied with ships building or planned for production.

Swan, Hunter and Wigham Richardson, Wallsend-on-Tyne, are understood to have received the orders. Two of the vessels will be geared turbine ships and the others motor ships fitted out with Doxford (British) engines.

Shipyards and marine equipment works on Britain's North-East coast in general are well supplied with orders, especially export work. Some firms report that more than 50 pct of order backlogs today are for foreign delivery.

Auto Price Increases Explained in Britain

London

• • • Major increases in the price of new automobiles now coming on the market here are largely due to increased component and materials costs, according to a recent discussion in the *London Times*. Percentage increases have been much larger in non-metallic materials than in the metals, the increase for some rubberized felt amounting to 245 pct.

Engineering wage increases have

amounted to about 50 pct of the pre-war rates in some Birmingham plants, and the prices of steel forgings have advanced sharply. The wages necessary to build a component of a medium sized car chassis that amounted to \$22 before the war now total \$37.75.

Feeling here is that there will be no price reduction of substantial size in the near future, although there are hopes of a scaling down of the government's purchase tax, which now approximates 20 pct of the purchase price.

Canadian Railways To Expend \$138,000,000

Ottawa

• • • Canadian National Railways plans expenditure in the reconstruction period of \$138,000,000, president R. C. Vaughan announced. The program for purchase of new rolling stock and other equipment will amount to over \$98,000,000, for which the money already has been provided in depreciation reserve. In addition the CNR will spend \$34,000,000 to make up war backlog on maintenance as soon as men and materials are available.

Mr. Vaughan stated that further sums of between \$6,000,000 and \$7,000,000 will be provided this year. Maintenance work during the war was confined to keeping lines and equipment safe and the company deferred all renewals and repairs not essential for this purpose. The \$34,000,000 reserve has been divided into amounts of \$19,000,000 for ways

Bethlehem Steel Stockpiles Wartime Ore Reserves from Chile

New York

• • • The Bethlehem Steel Co. has been stockpiling iron ore above ground in Chile throughout the war, it was revealed by President Eugene Grace at the announcement of operations of Bethlehem Steel Corp. and subsidiaries for the third quarter.

These high grade ore reserves will be available for use by Bethlehem in competition with Minnesota ores as soon as shipping tonnage has been constructed for its transportation. Meanwhile, the Bethlehem mining property in Venezuela is approaching completion, at which time it, too, will provide ore reserves for Bethlehem operations.

The Bethlehem Fairfield-Baltimore and the Hingham, Mass., shipyards are ending their operations. According to Mr. Grace, a deficit before taxes of \$27.2 million is due to cancellation of war contracts. Nevertheless, there are now \$546 million orders on hand. While Bethlehem has not been confronted with shortages of coal or scrap as yet due to the nature of its operations, it was said that labor continued to be a controlling factor and that some six thousand additional employees could be utilized in the Bethlehem plants, should men of the right calibre be obtainable.

Mr. Grace was of the opinion that the new Lackawanna bar mill should be ready for production in the fall of 1946.

Bethlehem's quarterly report showed a deficit of \$27,218,333, but this provides for depletion and depreciation charges and for amortization of emergency facilities to the extent of \$49,894,478. These figures compare with income of \$29.7 and \$31.9 million in the second quarter 1945, and third quarter 1944, respectively, and \$10.3 and \$13.0 million provision for depletion, depreciation and amortization during the corresponding periods.

Current Bethlehem steel production approximates 79.0 pct of capacity. The production of steel ingots and castings by Bethlehem averaged 87.4 pct of capacity during the third quarter, compared with 98.2 pct last quarter and 102.4 pct during the third quarter last year.

Continental Can Co. Earnings Increase

New York

• • • Net earnings of Continental Can Co., Inc., and wholly owned subsidiaries, for the twelve months ended Sept. 30, 1945, were \$7,250,294 as compared with \$5,964,799 net earnings for the 12 months ended Sept. 30, 1944.

Consolidated profits, before deducting \$5,381,295 for depreciation, \$7,023,626 for estimated income and excess profits taxes, and \$1,000,000 appropriated for inventory price decline or

The net income for the third quarter is estimated to be \$7,761,667, a result of crediting \$34,980,000 provision for taxes. This net income compares with \$8.0 and \$6.6 million, respectively, during the last quarter and the corresponding quarter last year. In the two quarters mentioned, deductions of \$21.7 and \$25.3 million were set aside for tax based on income.

A dividend of \$1.50 was declared on the common stock and the usual \$1.75 per share on the 7 pct accumulative preferred stock.

The total amount which the corporation and its subsidiaries expended from Jan. 1, 1940 to Sept. 30, 1945, inclusive, for emergency facilities and which they expect to claim as deductions from income for amortization aggregate \$124,012,240. Amortization aggregating \$79,874,770 have been deducted from income for periods prior to the third quarter of 1945.

other contingencies, were \$20,655,216. After dividends of \$300,000 on the \$3.75 cumulative preferred shares, this left \$6,950,294 applicable to the common stock, equivalent to \$2.43 per share on common.

These estimated earnings, compared with \$2.09 per share on common for the 12-month period ended Sept. 30, 1944.

Republic Earns \$1.6 Million Cleveland

• • • Republic Steel Corp. has reported a consolidated net income for the third quarter of \$1,617,676 after all charges including adjustment of accruals for estimated federal income and excess profits taxes. The earnings compare with \$2,195,526 for the corresponding quarter in 1944 and are at the rate of 21¢ per share of common stock. Earnings before Federal income and excess profits taxes dropped from \$13,821,703 for the second quarter to \$1,292,676 for the third quarter. Net income for the first three quarters of 1945 amounted to \$7,973,927.

Hanna to Buy Own Stock Cleveland

• • • M. A. Hanna Co. advised stockholders Oct. 24 that it has set aside \$3,055,000 for purchasing up to 65,000 shares of its common stock at \$47 a share, in accordance with the company's charter permitting the purchase of its common stock under

COMING EVENTS

Nov. 5—ASTE Greater New York Chapter Meeting, Hotel New Yorker, New York.

Nov. 6-7—SAE National Fuels & Lubricants Meeting, Mayo Hotel, Tulsa, Okla.

No. 16-17—Forty-Sixth Annual Convention, National Metal Trades Assn., Hotel Cleveland, Cleveland.

Dec. 3-4—Fourth Annual Conference, Steel Products Warehouse Assn., Hotel Cleveland, Cleveland.

Dec. 3-5—SAE National Air Transport Engineering Meeting, Edgewater Beach Hotel, Chicago.

Dec. 5-7—Fiftieth Annual Meeting, National Assn. of Manufacturers, Waldorf-Astoria, New York.

Jan. 7-11, 1946—SAE Annual Meeting and Engineering Display, Book-Cadillac Hotel, Detroit.

Jan. 21-23—1946 Convention of Institute of Scrap Iron & Steel, Inc., Congress Hotel, Chicago.

Feb. 4-7—National Meeting, American Welding Society, Hotel Cleveland, Cleveland.

Feb. 4-8—National Metal Exposition, Public Auditorium, Cleveland.

Feb. 4-8—National Metal Congress, Public Auditorium, Cleveland.

Feb. 4-8—American Society for Metals, Statler Hotel, Cleveland.

Feb. 4-8—National Meeting, Iron and Steel and Institute of Metals Div., American Institute of Mining and Metallurgical Engineers, Statler Hotel, Cleveland.

Feb. 6-8—American Industrial Radium and X-ray Society, Hollenden Hotel, Cleveland.

certain definite conditions and restrictions.

According to the letter sent to stockholders, some estates owning M. A. Hanna Co. common stock desire to sell some of this stock along with other securities to raise money for inheritance tax payments, and are willing to accept \$47 a share for some substantial blocks of this stock, although the current market for more limited amounts of stock is now quoted at from \$53 to \$55 a share.

Midvale Reports Profits

Philadelphia

• • • The Midvale Company reports net profit of \$2,102,472, for the twelve months ended Sept. 30, 1945. This amount is after estimated provision for renegotiation of war contracts, Federal and Pennsylvania taxes on income, and after provision for contingencies. The net profit is equivalent to \$3.50 per share on the company's outstanding common stock.

Sloss-Sheffield Loss

Birmingham

• • • A net loss of \$60,541 for the third quarter of the year has been reported by Sloss-Sheffield Steel & Iron Co. here.

Hugh Morrow, Sloss president, said the loss was caused mainly by strikes during August at the company's manufacturing plants and by a fire at the City Furnace Plant which interrupted pig iron production.

The company's net income after Federal income tax for the nine months ended Sept. 30, 1945, was \$206,587. During that period dividends of \$128,911 were paid on the preferred stock and during the first six months dividends amounting to \$148,977 were paid on common stock. No dividend was paid on common during the third quarter.

J&L Earns \$1.3 Million

Pittsburgh

• • • Jones and Laughlin Steel Corp., reported earnings of \$1,343,295 for the quarter and \$5,714,308 for the nine months ended Sept. 30, 1945. These net earnings are after all charges including depreciation, depletion, interest and taxes. Income before federal income and excess profits taxes for the third quarter totalled only \$352,296, to which was added \$991,000 which was the result of a reduction in tax provisions due to the decreasing rate of annual earnings during this quarter. This amount, added to the earnings before federal income and excess profits taxes, yields the total quarterly income of \$1,343,295. For the nine months, however, tax provisions total \$5,957,000.

Baldwin Reports Income

Philadelphia

• • • The Baldwin Locomotive Works reports that the consolidated sales of the company and its wholly owned subsidiaries for the twelve months ended Sept. 30, 1945 were \$178,701,048

before renegotiation of war contracts; and that net profit amounted to \$3,440,296 after deducting estimated provision for renegotiation of war contracts, Federal and Pennsylvania taxes on income, and increase of reserve for contingencies and postwar transition. Dividends of \$746,213 were received from The Midvale Co., of whose capital stock Baldwin owns 62.83 pct. After payment of preferred stock dividends in the amount of \$163,029, the remainder of net profit (\$3,277,267) for the twelve months ended Sept. 30, 1945, is equivalent to \$1.75 per share on the 1,875,553 shares of common stock outstanding as of Sept. 30, 1945.

Continental Steel Profit

Kokomo, Ind.

• • • Net profit of Continental Steel Corp. for the third quarter dropped to \$138,566.72 from \$208,672.61 for the second quarter, but rose from the \$120,522.23 net profit for the third quarter of last year.

For the nine months ended September 30, net profit was \$499,131.44, compared with \$443,901.73 for the same period of 1944. Profit figures are after provision for all known contingencies and taxes.

Net sales for the quarter just ended were \$5,460,747.24, compared with \$6,204,876.16 for the preceding quarter and \$5,641,620.53 for the equivalent quarter of 1944. Sales for the first nine months of 1945 totaled \$17,649,378.79. For the first nine months of 1944 they were \$16,773,883.81.

PIG IRON STOCKS DOWN: Figures below show, according to The American Iron & Steel Institute, that pig iron output is lower but October data will show further declines in number of furnaces working in view of enforced shutdowns following the coal strike. After present labor difficulties are solved the slow but continuous decline in pig iron output may uncover one of the tightest raw material situations since early phases of the war.

Blast Furnace Capacity and Production—Net Tons

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL			
			September	Year to Date	September	Year to Date	September	Year to Date	Per Cent of Capacity	
									Sept.	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern.....	12	12,988,970	794,224	7,485,589	26,184	277,913	820,388	7,743,502	76.9	79.7
Pittsburgh-Youngstown.....	15	25,904,240	1,634,140	16,967,523	17,713	185,378	1,651,853	17,192,901	77.7	86.5
Cleveland-Detroit.....	7	6,589,500	427,220	4,241,225			427,220	4,241,225	79.0	86.0
Chicago.....	7	14,070,510	889,403	9,003,898	831	15,767	890,034	9,019,665	77.1	85.7
Southern.....	8	4,924,670	322,056	2,834,975	11,009	108,447	333,067	2,943,422	82.4	79.9
Western.....	4	2,836,000	104,190	1,329,286			104,190	1,329,286	44.8	62.7
TOTAL.....	37	67,313,890	4,171,235	41,842,496	55,517	587,905	4,226,752	42,420,001	76.5	84.3

Tool Builders Urge More Goods for More People at Less Cost

Chicago

• • • "More goods for more people at lower prices," was the keynote of the 44th annual meeting of the National Machine Tool Builder's Assn., the largest in its history as expressed by Joseph L. Trecker, executive vice-



William P. Kirk

president of Kearny & Trecker Corp. He stated that, in his opinion, it is the failure of industry to educate the public to an understanding of the basic economics behind the volume production principle that has led to much of our

present social unrest. In explanation of this principle he showed that if a company, by the aid of good machine tools and other production equipment, can cut the cost of its product, it can offer that product at a lower price. As the price goes down, its potential market increases. As its market increases, its volume goes up. As its volume goes up, it can hire more men.

In conclusion, Mr. Trecker called upon the government to revise its tax policies so as to offer an incentive, rather than place a penalty on the installation of new equipment that will lead to greater productivity, and stated that unless the present philosophy of limited productivity can be defeated, we stand to face in this country a steady decline in the invention and development of new devices, a slowing down in scientific advancement, and a retrogression in our standard of living.

Alexander S. Keller, vice-president of Pratt & Whitney and chairman of the Foreign Sales Committee, spoke at some length of the various aspects of selling abroad. He pointed out the urgent need for manufacturing equipment in most of the countries of Europe, but strongly urged that no piece of American equipment be permitted to leave the country without being thoroughly inspected and overhauled, lest the reputation of American manufacturers be imperilled by the export of faulty machines. Speaking of Russia, Mr. Keller mentioned that much of the equipment built under lend-lease for Russia, but never

delivered, may eventually be purchased through a loan now being negotiated. The amount of this loan and the proportion allocated to machine tools, is not yet decided, but it is understood that it is to run for 30 yr at 2% pct.

Reporting for the Color Standards Committee, William L. Dolle stated that it had been decided to adopt the new light gray color introduced just before the war, but dropped by government order in favor of the present dark gray.

Speaking on the price situation, Phil Huber, president Ex-Cell-O Corp. and chairman of the OPA Machine Tool Advisory Committee, stated that for the present, at least, price controls will not be removed from machine tools, although it is hoped to hold a meeting with OPA in the near future to discuss the possibility of increasing prices on some items. He pointed out that a lifting of the ceiling would not result in a general, all-around price increase, and was hopeful that some relief might be obtained in the not too far distant future.

The subject of surplus machine tools was capably handled by William P. Kirk, vice-president and sales manager of the Machinery Div. of Pratt & Whitney, who was elected the new president of the association at this meeting, succeeding Mr. Trecker. He emphasized that surplus might be used to wreck the machine tool industry, or to increase the efficiency of the whole metalworking industry, depending entirely upon how it was handled.

Calling for greater speed in handling surplus, and for the abolition of priorities, Mr. Kirk urged more vigorous action on the part of the armed services in setting up a reserve of machines against a possible future emergency. He proposed also, that a resale discount be allowed to recognized dealers and manufacturers so as to enlist their experience in selling to those customers who hesitate to buy from a government agency which has no real interest in selling the right machine for the job, or in its future performance.

Regarding machines 15 yr old or older, the speaker indicated that there were 600,000 of these still in use, and urged that these be replaced immediately by newer machines from the surplus stocks. This replacement program could be accelerated by offering an inducement to any manufacturer who will scrap an old machine, by allowing an additional discount from the Clayton price of the surplus modern machine he buys as replacement. Mod-

ernization of all industries, he said, would absorb the greater part of the surplus and would increase the standard of living by making possible the manufacture of more consumer goods at lower prices and the employment of more workers.

The convention closed with a symposium of conditions in Europe, the speakers being George H. Johnson, president, Gisholt Machine Co., Harry Crump, Carboly Co., and Reed M. Andress, second vice-president, Barnes Drill Co.

All of these speakers had spent some time in Europe immediately following VE-Day, and reported that, despite the tremendous bomb damage in Germany, very little serious damage had been done to the machine tool industry. It was their belief that there were more machine tools in operation in Germany at the close of the war than in America, and that less than 15 pct had been damaged beyond the point of reasonably easy repair. Machines were found to be of excellent quality and generally not more than 5 yr old. This condition was attributed to the tax policy in operation in Germany which permitted a manufacturer to write off his equipment at a rapid rate, conditional upon his scrapping a certain amount of old machines. With tax penalties upon modernization removed, industry immediately modernized with the result that it became possible to build up a productive capacity sufficient to handle all war requirements on a one shift basis.

Publishes Bearing Engineering Text

Philadelphia

A technical book entitled "Ball and Roller Bearing Engineering" has been published by SKF here to serve as a fundamental text on all phases of bearing applications to industry.

The 270-page book, containing some 900 drawings and tables, begins with a technical description of common bearing types. Both radial and thrust bearings are discussed comprehensively in Chapter I together with data on dimensional proportions, running accuracy and tolerances of each type.

"Forces and Motions in Bearings," the second chapter, is devoted to theory and calculations on such subjects as the nature of rolling resistance, friction torque, friction coefficients, stresses and deformations, load distribution, motion and inertia.

Russell, Burdsall & Ward Co.

Marks Its 100th Anniversary

By Publication



EARLY START: A view of the original shop at Pemberwick, Conn. Today the manufacturing of fasteners is carried on by RB&W at three plants located in New York, Pennsylvania and Illinois.

Port Chester, N. Y.

• • • The year 1945 marks the 100th anniversary of the Russell, Burdsall & Ward Bolt and Nut Co., which had its origin when manufacturing wooden screws at a button shop in Pemberwick, Conn.

Starting in 1845 they have been supplying bolts, nuts and other fasteners in holding the country's mechanisms together in constantly increasing quantities, and today the range of products manufactured by RB&W plants varies from small screws weighing a fraction of an ounce to large nuts weighing 25 lb each, the three plants using 400 miles of processed metal daily.

The oldest and largest plant, which was built in 1882 becoming the company's main factory when the original was given up and the operations of the two merged, is located in Port Chester, N. Y. To enable the company to give better service to its customers another plant was built in Rock Falls, Ill., many years later. And situated at Coraopolis, Pa., is the third plant, the largest in the world devoted entirely to making nuts.

Such fasteners are produced by a specialized and complex industry that originated sometime in the sixteenth century. It was not until 1798 with the introduction of the slide-rest lathe that the slow process of fashioning simple threaded products on crude lathes was noticeably advanced. However, it was in the nineteenth century that the way was paved for making bolts and nuts in quantity, when William E. Ward, one of the founders of RB&W, invented the world's first automatic cold-heading machine—a device that brought the young firm from obscurity to a position of leadership.

Russell, Burdsall & Ward Bolt and Nut Co. has an important place in this vast enterprise of making fasteners. Throughout the years, it has led the parade of inventions that steadily increased the productive capacity and

accuracy of bolt and nut making machines, endeavoring to move not only with, but ahead of the times. Nearly 60 pct of the wartime production of the three plants went to the armed services, with the balance going to manufacturers of other essential materials. It is through the combined efforts and cooperation of the men and women that RB&W has been able to

do its part in supplying important material in vast quantity to the country.

In commemoration of the 100th anniversary, a lasting record of what they have accomplished has been put into book form, tracing the company's growth from the founders' first idea for making bolts by machine up to the present.

Sees Surplus Program Lasting for Ten Years

Chicago

• • • Surplus property disposal constituted the principal topic of discussion at the reconversion convention of the Machinery Dealers' National Assn. here last week when precautions were made concerning sale of government machine tools.

Harvey H. Goldman, representing industry on the panel discussion on surplus property, predicted that the selling program would extend over a 10-yr period.

Harold Gross, president of the Dominion Machinery Dealers Assn., outlined the method by which Canadian dealers receive discounts on surplus machinery under the jurisdiction of the War Assets Corp., counterpart of RFC.

M. A. Hoel, Reconstruction Finance Corp., Chicago, reported that surplus property with an acquisition cost of \$2,856,282,000 was in the hands of RFC Oct. 31, 1945. The total comprised \$962,253,000 in salable items of which aircraft and parts represented \$348,371,000, or about 36 pct. Non-salable items were valued at \$1,894,029,000, including 21,459 non-flyable aircraft. Thus less than 22 pct of the total surplus property on RFC

books represents salable material other than aircraft and parts, it was indicated.

Mr. Hoel said that the Chicago RFC agency, as of Oct. 15, has received into its inventory property having an aggregate acquisition cost of \$79,769,972, of which it has sold \$13,218,706 in terms of acquisition cost, or 17 pct. It has received \$8,124,062 or 61 pct of the acquisition cost of items sold. Of this total of sales receipts, machine tool sales represent \$3,561,152, or 44 pct.

In addition to the foregoing sales, he declared, the Chicago agency has made sales to contractors in possession having an acquisition cost of approximately \$6,850,000 which brought RFC approximately \$4,075,000.

A proposal was brought before the convention that the association establish standards for rebuilding of used machine tools.

New officers elected are: Harvey H. Goldman, Harvey Goldman & Co., Detroit, president; Max Leach, H. Leach Machinery Co., Providence, R. I., first vice president; Samuel Given, Given Machinery Co., Los Angeles, second vice president; and Charles L. McDonald, Sr., McDonald Machinery Co., St. Louis, treasurer. Randolph K. Vinson, Chicago, remains as executive director.

Industrial Briefs . . .

• **PREFABRICATED HOMES**—Colorado Fuel & Iron Corp. and Wickwire-Spencer Steel Corp. have been licensed by the General Panel Corp., New York, to manufacture prefabricated homes.

• **SPEEDS OUTPUT**—The Farm Equipment Div. of Graham-Paige Motors Corp., Detroit, plans to produce a minimum of 50,000 rototillers during the first full year of operation at Willow Run.

• **CITY BUYS SHIPYARD**—City of Providence has purchased the Walsh-Kaiser shipyard for \$308,093.08. The American Screw Co. has under consideration the purchase of three of the largest buildings in the yard: Steel frame building having 189,400 sq ft, floorspace; plant and angle shop with 164,000 sq ft, and a wood frame building with 84,300 sq ft.

• **BUYS FACTORY**—W. E. Limbocker, of Kansas City, Kan., has purchased a two-story factory building at 3212 Dickson St., St. Louis, where he will install a die-casting plant. The building contains 22,000 sq ft of floor space.

• **STEEL SERVICE**—Ziegler Steel Service Co., Los Angeles, intends to carry a complete stock of steel sheets, strip and light plate in hot rolled, hot rolled pickled and oiled, cold rolled and galvanized finishes. Arrangements have been made for production shearing facilities and should be available in the very near future.

• **ACQUISITION**—American Chain & Cable Company, Inc., Bridgeport, Conn., has acquired the business of the Certified Gauge & Instrument Corp., of Long Island City, N. Y. The principal product of the latter company is a pressure gage with a new patented mechanism called the Helicoid movement.

• **BUYS OHIO PLANT**—Gar Wood Industries, Inc., Detroit,

has purchased 92 pct of the capital stock of Buckeye Traction Ditcher Co., Findlay, Ohio. Buckeye operations will be expanded and some products now made in Detroit will be moved to Findlay.

• **BUYS WAREHOUSE**—The continuance of the business of Wm. G. Wetherall, Inc., steel jobbers, under the ownership and control of Joseph A. Doyle, Jr., who became President of the company in October, 1945, has been announced.

• **TRANSFORMER OUTPUT**—General Electric Co. has leased, with an option to purchase, the Farr Alpaca Co. No. 2 plant in Holyoke, Mass., for the manufacture of transformers. The Holyoke plant has 300,000 sq ft floorspace, when operating full will have more than 1500 workers.

• **SHIPYARD CLOSES**—Activities at the New England Shipbuilding Corp., South Portland East and West Yards ceased Nov. 1, and shortly thereafter everything there except land and large buildings will be sold as surplus material.

• **ASSEMBLY PLANT**—Crosley Motors, Inc., Cincinnati, has announced purchase of a plant at Marion, Ind., for the production of its new postwar car. Officials of the company state that the plant will be used for assembling of the new car. Engines for it, however, will be built at the plant of the company.

• **VAN NORMAN EXPANDS**—Van Norman Co., Springfield, Mass., machine tools, plans to build a one-story addition to its assembly plant.

• **WAUKESHA MOTOR BUILDS**—Waukesha Motor Co., Waukesha, Wis., is making plans for building a new factory structure adjoining the present building which will be used for expanded production of refrigeration units.

Mass Production Of Prefabricated Home Utilities Planned

Chicago

• • • **Ingersoll Steel & Disc Div.**, Borg-Warner Corp., will freeze design at the end of this year and start production next spring on its home utility unit.

The unit is built around an enclosed central core containing household heating, hot water, plumbing, electricity and meters. Attached to the sides are a complete kitchen, laundry and bathroom, with floor areas, walls, windows and doors placed according to individual house plans.

The unit, which President Roy C. Ingersoll says meets building codes in all states, will be prefabricated and shipped from the company's Kalamazoo, Mich., plant. The appliances, sinks, tubs, and metal cabinets, all of which are or will be built by Ingersoll or other Borg-Warner subsidiaries, will be assembled in integrated designs. Mass production and line-assembled consolidation of household utilities and appliances is expected to reduce costs to allow the units to sell in the low price field with financing all under the single household mortgage.

The unit allows great architectural flexibility with the single provision that the kitchen, laundry and bathroom be built around the steel-framed utility plant.

Ingersoll is building 12 houses at Kalamazoo for test purposes. In addition to savings due to mass assembly, the unit is said to permit a reduction in cubage of the house and thus reduce its cost.

Production of sinks, tubs, and basins will be new with Ingersoll, which is expanding its deep-drawing operations considerably. The company has recently become a principal manufacturing agent for Bendix home laundries. The Norge Div. of Borg-Warner is a large producer of refrigerators and stoves. Ingersoll, incidentally, will soon reenter the beer barrel field with a 37-lb mild steel barrel with a possible later production of stainless barrels.

Initial market for the units will be through large scale contracting home builders, with attention being given to manufacturers of prefabricated housings. Eventually, smaller sales will be made and the possibilities of use of the unit in remodeling developed.

House Report Criticizes OPA Pricing Policies; Recommends Changes

Washington

• • • Calling for immediate revision of OPA pricing policies, the Special House Committee to Investigate Executive Agencies in a recent report charged that rigid adherence to outdated and inapplicable pricing formulae has retarded reconversion, reduced production, restricted opportunity for full employment and in some cases has actually caused price rises in cost-of-living items.

The Committee recommended that the pricing agency take the following actions:

1. Formulate and adopt a policy which will permit commodities to be priced by producers at levels which in the light of accepted accounting standards will reflect current production costs, plus a normal prewar margin of profit.

2. That the policy be formulated and administered in such manner that prices so computed may be submitted to regional and local OPA offices on simplified forms that afford no opportunity for the rise of divergent interpretations.

3. That such prices go into effect after a specified time unless the producer is notified to the contrary by the OPA office.

4. That retail prices be adjusted so as to reflect any dollar increase allowed to manufacturers, except where the mark-up on the particular item is already sufficient to reflect a normal profit.

5. That except where monopolistic control of supply exists, price control be suspended on any commodity whenever it appears that supply and demand are in a relative state of balance or where supply exceeds demand. Toward this end, producers shall be given the opportunity to demonstrate that such a situation exists.

6. That the Administrator concentrate activities of his agency to the accomplishment of the foregoing policies.

7. That the policies enunciated in the Maximum Average Price Regulation be reviewed for the purpose of revoking or modifying it. Apprehension is felt that this policy is a definite deterrent to reconversion, industry having complained bitterly as to its effect on production of low-cost items.

OPA policies have compelled manu-

facturers to discontinue production of prewar low-priced commodities involving know-how for volume output, the report declared, and have permitted new manufacturers to enter the field at higher prices than were necessary to enable established manufacturers to continue in business.

The primary need of ever-increasing production should be reflected in

Bowles Makes Reply

Washington

• • • In an answer to the House Committee report criticizing OPA, OPA Administrator Chester Bowles expressed amazement that such sweeping proposals were advanced after holding "fragmentary hearings largely unrelated to the program." As far as he could determine, Mr. Bowles said, only witnesses from the retail trade were heard with the exception of an economist retained by retail groups, an awning manufacturer and a small-volume manufacturer of aluminum cooking utensils.

With regard to criticism of the Maximum Average Price Plan, Mr. Bowles pointed out that the vigor of the complaints by the trade indicates the difficulties met by OPA when industries are forced back from profitable high-margin lines to the production of a normal proportion of low-priced lines.

"From our practical experience in administering price control laws, I can predict with confidence that the adoption of your basic pricing proposals for manufacturers would bring about the rapid and disastrous collapse of price control," he declared.

the actions and policies of OPA, the report emphasized, and no action curtailing production should be taken. Where there is conflict between rigid holding of the price line on the one hand and increasing production on the other, the latter must now be the controlling consideration.

Commenting on the relief provisions of present pricing regulations, it was pointed out that not all reconverting manufacturers are eligible for relief because "eligibility" is a technical term and, as used by OPA, has the practical effect of excluding many manufacturers who actually engaged in war production.

The report, in criticizing the policy which permits OPA withdrawal of prices granted reconverting manufacturers, stated that such action is a formidable obstacle to production and a positive brake upon the Nation's economy. Instead of securing a price upon which he can safely found his business activity, a manufacturer must venture forth upon administrative quicksand.

Having prescribed percentage increase factors for calculating prices and also the exclusive means for securing hardship relief, OPA puts a manufacturer on notice that in so applying he must submit management of his affairs to the pricing agency and substitute the wisdom of its staff for his own in arranging the production and distribution pattern.

With regard to the problem confronting retailers and distributors in absorbing price increases given manufacturers under hardship cases, the report stated that the only limitation on the degree of absorption depends on expense factors which, in turn, do not take into consideration 80 pct of the total distributive elements in the country. The lack of means whereby individual distributors may be afforded hardship relief, it was pointed out, places them in situations whereby losses must be sustained on some items or withhold them from the market until OPA action is forthcoming.

Transfer OSP to RFC

Washington

• • • Further centralizing the disposal of surplus property, President Truman in an Executive Order, issued Oct. 19, transferred the Office of Surplus Property in the Dept. of Commerce to RFC, effective Nov. 5. Commerce has been responsible for the disposal of surplus consumer goods since last spring, when the job was transferred from Treasury's Procurement Div.

The War Assets Corp., a subsidiary of RFC, will handle the disposal of all surplus property that will become the responsibility of RFC, including consumer goods. The WAC will have a board of directors of seven members, five from RFC and two from the Surplus Property Administration. Sam H. Husbands, member of the board of directors of RFC, will be the chairman of the board of WAC. The corporation will be staffed by RFC personnel and Dept. of Commerce personnel who will be transferred to RFC.

MACHINE TOOLS

... News and Market Activities

Dealers May Sell Surplus Machines

Cleveland

• • • Rumors that the Reconstruction Finance Corp. was inclined to feel that the volume of machine tool inquiries and orders flowing into disposing agencies precluded any need for calling upon regular trade channels for tangible assistance in the surplus problem coalesced in Washington last week with the net and antithetical re-

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sult that a regulation allowing manufacturers and dealers, new and used, to be selling agents if they so desire, is in the writing.

This move, however, which was in the wind about two months ago, may not produce the idyllic situation that appeared to be in the offing when it was first discussed. Competent observers point out that now RFC, or the Surplus Property Board, or both, must separate the sheep from the goats where the dealers are concerned, a delicate task at best, with suggested discounts averaging about 15 pct.

Two suggestions, calculated to implement or aid in this endeavor, have been made. First, the government can take warranty that the machines will be sold in accordance with the Clayton Formula, subject to the usual penalties for fraud. Second, RFC and SPB have lists of manufacturers, dealers and used machinery dealers' associations, and these could be used as a guide to people regarded in the trade as legitimate operators. Sellers not on these lists would be checked closely and required to fill out an application form with proper references, financial and otherwise. Veterans, of course, have an undisputed right to participate.

In the event a customer wants to buy for a long term that is provided for in the Smaller War Plants proposal. But those close to the situation feel that while politically this long-time offer is a nice thing (15 pct down and 5 yr at 4 pct interest) actually in their hearts they feel it is bad. It seems better to take business on a cash basis and let commercial institutions, banks, etc., handle the financing involved rather than the

government handling credit. In order to encourage the long-term payment plan, it was felt there might be some holdback of the discount due the distributor or agent acting for RFC. But that can't be very much, for in the case of a distributor using his working capital for RFC, he could run through his money hiring help and meeting the other expenses involved and there would be no money coming in. Thus there would have to be a rather reasonable holdback.

As matters stand now, surplus machines are not clearing rapidly to RFC in some districts, Cleveland for example, and nothing much of interest is showing up on the lists which are largely made up of miscellaneous junk, according to the dealers. In Detroit, there are about six storage depots well stocked and this is believed to be one of the reasons why RFC said there was "no problem."

But in a few months or weeks RFC will very definitely have thousands of machine tools they will have to get rid of. When tools go into storage they accumulate from 10 to 20 pct in cost in being skidded and slushed, therefore it would appear that the best way to sell would be from lessees' plants where either agents or customers can inspect the tools and see what they are getting.

There is some possibility that the Clayton formula will be extended up to 15 yr or thereabouts, which will saddle RFC with another headache in the form of a lot of prewar equipment that should either be scrapped or sold at a negotiated price. Trade sources feel that the Clayton formula should be kept, but its importance lies in its application to equipment built since 1940. RFC's lessees bought many used machines, and when the formula was written most of this equipment, about 95 pct of it in fact, was in the 3-yr period. If the formula is extended, the machines will get into the 5-yr period and equipment certainly depreciates more due to obsolescence than to use.

Perhaps reflecting the attitude of some manufacturers other manufacturers are on record in emphatic terms that their sales forces and dis-

tributors' sales forces should be 100 pct in distributing surplus machines.

Some machine tool distributors don't care much one way or the other, feeling, apparently, that if they want to actively enter the used market, they can go out and buy privately-owned equipment, which they will have to sell for less than RFC's machines, which would not serve to strengthen the Clayton formula.

Manufacturers who might feel, despite the way they talk to RFC, that they would like to have distributors devote 100 pct of their time to selling new equipment, are another factor. This is said here to be short-sighted because if distributors stand a chance of being put out of business by RFC's sales, it is better to let them handle surplus machines than to lose a representative.

Strikes Impede Tool Output

Cincinnati

• • • Recent strikes and work stoppages in other areas are being felt by district machine tool builders. Several manufacturers indicate that completion of tools is being held up by inability to receive electrical equipment, motors and some accessory material. Follow-up of suppliers has revealed that the delay results from work stoppages and strikes in the plants of suppliers. Current business is reported in reasonable volume and pessimism is lacking in this area. In fact, many tool builders indicate sufficient business to sustain production for the remainder of this year, and some into next year. Comment also says that a fairly substantial automotive need is still in the offing.

Tool Steels Based at Dunkirk

Pittsburgh

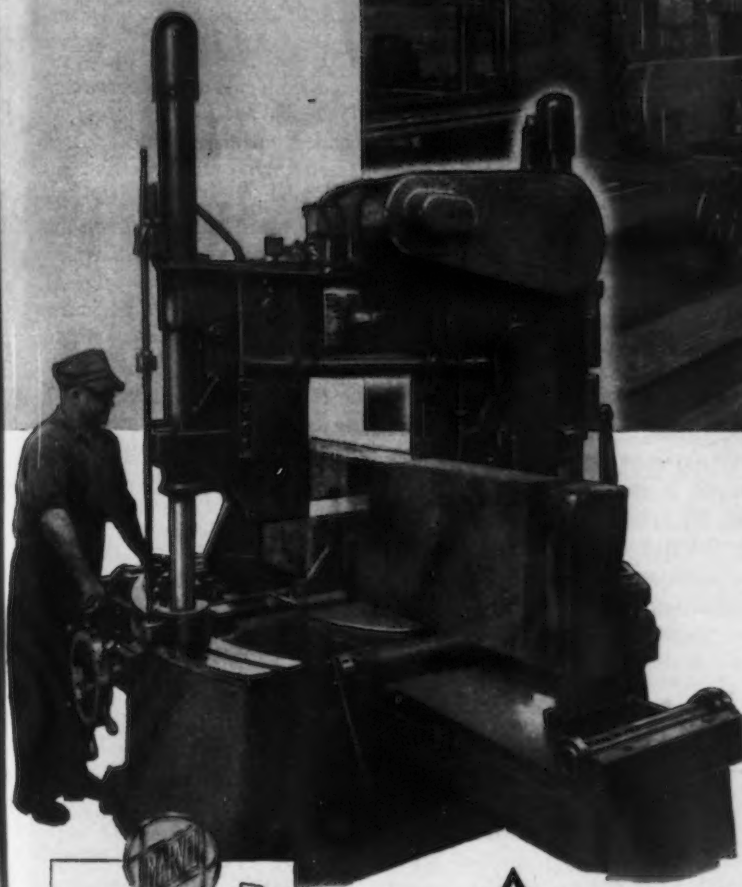
• • • Allegheny Ludlum Steel Corp. has established Dunkirk, N. Y., as a basing point on tool steel forging billets, bars and drill rods and bits, including high-speed tool steels. The present basing points on these products now are: Pittsburgh, Bethlehem, Syracuse and Dunkirk, N. Y., and for certain steels Canton, Ohio.

Production points not yet established as basing points are Chicago Heights, Ill.; Reading, Pa.; Philadelphia, and Lockport, N. Y.

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MARVEL No. 18 Giant Hydraulic Saw—which, with the exception of its larger "sister" the MARVEL No. 24 (capacity 24" x 24"), is the largest capacity hack saw built. With this battery of modern sawing equipment this firm gets the utmost in Speed, Accuracy and Economy, no matter what the job calls for. Furthermore, because of the automatic features of these saws, one operator takes care of all 3 of them.

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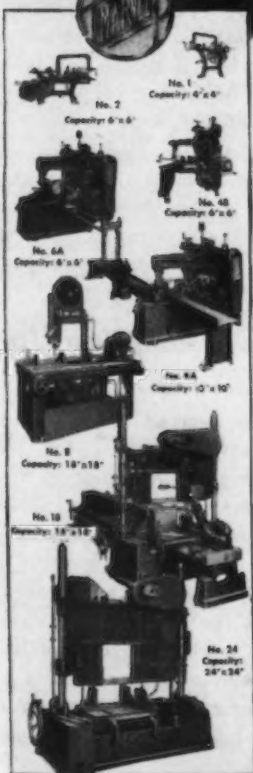
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MARVEL SAWS



NONFERROUS METALS

... News and Market Activities

Estimate 3 Billion Lb Aluminum War Scrap

Chicago

• • • Government controls on secondary and scrap nonferrous metals will continue for a year or longer, it was predicted here last week before the National Association of Waste Material Dealers, Inc., by Joseph Viener, president of the metal dealers' division.

Government activity in the field probably will be felt for many years, Leo J. Messinger, chairman of the nonferrous metal panel, declared.

Approximately 3 billion lb of secondary aluminum will be available as war residue, Carl H. Burton, secretary of the Aluminum Research Institute, stated. He estimated that this amount would constitute a five to six year supply. Mr. Burton viewed favorably the prospect that aluminum alloy prices will go low enough to encourage increased use, thus affording a larger active market for aluminum scrap. He saw little possibility of stability at present levels in the price of remelt alloy ingots.

Pooling of sources of scrap steel and nonferrous metals through cooperatives of dealers for the export market was proposed by Benjamin Schwartz, executive vice-president of the New York Commodities Corp. He said that a wider base of trading must be provided to satisfy foreign markets for scrap and that cooperatives would assure volume and quality.

Antimony Supply Better

New York

• • • Antimony which has been in very short supply recently is reported to be at last adequate to meet requests on WPB without limitation. Nevertheless there is little immediate prospect of a relaxation in control of this metal. It has been reported that limited stocks are available in stockpile in China but there has been no official confirmation of this. Antimony ore continues to come in from Latin-American producers into the Laredo, Texas refinery and this refined product is our only source of the metal.

Consumers have been anticipating early receipt of Chinese antimony

since the end of the war but there is no assurance that it will be possible to re-establish the industry in China on a competitive basis with inflationary trends operating in that country.

Reported Tin Stock Dwindles Somewhat

New York

• • • Consumers of tin have had their hopes dashed recently by a disclosure of the WPB that the reported 17,000 tons of tin in the Orient has dropped to what is estimated as 4000 tons tin and 3000 tons tin in concentrate. In the meantime three U. S. observers have been designated to represent this country's interest in the Malay peninsula to inspect tin producing facilities together with the British Empire delegation. Meanwhile government officials are continuing to warn against over-optimism about early relaxation of tin and lead restrictions.

Zinc Demand Growing

New York

• • • Zinc consumption is reported by the industry to be slowly improving although it is still far from what could be desired by producers considering the large zinc stockpile and the relatively high rate of current production. The improvement in consumption is believed to be accounted for very largely by the pickup of reconversion production with the passage of time. Meanwhile the full demand of reconversion is not yet apparent since strikes at auto manufacturers and galvanizers have been holding up their requirements. Now apparently this tendency may be expected to increase with the approaching strike of mine, mill and smelter workers at certain Connecticut Valley brass mills.

Cadmium Still Tight

New York

• • • Cadmium, while not under government control, is in very tight supply with producers finding it necessary to ration their customers.

Reconversion Metals Will Be Stockpiled

Washington

• • • WPB has set up a reserve of metals and minerals to protect reconversion needs. Approximately 50 metals and minerals, including ferroalloys, are involved. Iron ore and steel are not included.

Under the plan, WPB and its successor agency CPA will allocate to manufacturers, on the basis of essentiality, quantities of metals and minerals required to break reconversion bottlenecks.

Among the metals which will be doled out are tin, magnesium, copper, aluminum, cobalt, manganese, antimony, lead, zinc, fluorspar, mercury, and molybdenum.

Lead Outlook Unchanged

New York

• • • The lead supply picture continues in the same plane as in recent months with the stockpile gradually being drawn on to supply requirements which were relaxed to permit greater use of white lead and other lead containing chemicals early last month. Stockpile is falling at a rate of about 7000 tons a month and is expected at the beginning of November to approach 86,000 tons.

Lead from Mexico and Peru normally imported into the United States, is now going abroad to foreign consumers under the impetus of our fixed prices.

Copper Consumption Up

New York

• • • Copper demand has increased appreciably with forecasts for November consumption reaching as high as 100,000 tons. The primary force behind this increase in consumption is believed to be the growing impetus of reconversion. However, a secondary factor may be the approaching strike of brass mill workers in Connecticut Valley mills and a natural desire on the part of consumers to insure adequate inventories of copper despite the strike.

NONFERROUS PRICES

Primary Metals

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd (Min. 10,000 lb.)	15.00
Aluminum pig	14.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars, per lb. contained Be	\$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	\$1.50 to \$1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.8%, dollars per troy oz.	\$ 2.25
Iridium, dollars per troy oz.	\$90-\$100
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb flask, f.o.b. New York	\$106 to \$109
Nickel, electro	35.00
Palladium, dollars per troy oz.	\$24.00
Platinum, dollars per oz.	\$35.00
Silver, New York, cents per oz.	71.11
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2) 9.00 to 10.00	
Aluminum, deoxidizing No. 2, 3, 4	\$6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb)

	Extruded Shapes	Rods	Sheets
Copper	20.37		20.37
Copper, H.R.		17.37	
Copper drawn		18.37	
Low brass, 80%		20.40	20.15
High brass			19.48
Red brass, 85%		20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut		15.01	
Commercial bronze, 90%		21.32	21.07
Commercial bronze, 95%		21.53	21.28
Manganese bronze	24.00		28.00
Phos. bronze, A, B, 5%		36.50	36.25
Muntz metal	20.12	18.37	22.75
Everdur, Herculey, Olympic or equal		25.50	26.00
Nickel silver, 5%		28.75	26.50
Architect bronze	19.12		

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (1/4H); 52S, 61c. (O); 24S, 67 1/2c. **Plate:** 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 52S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28 1/2c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: 1/4 in., 28 1/2c. per lb.; 1/2 in., 26c.; 1 in., 24 1/2c.; 2 in., 23c. Hexagonals: 1/4 in., 34 1/2c. per lb.; 1/2 in., 28 1/2c.; 1 in., 25 1/2c.; 2 in., 25 1/2c. 2S, as fabricated, random or standard lengths, 1/4 in., 24c. per lb.; 1/2 in., 25c.; 1 in., 24c.; 2 in.,

23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27 1/2c.

NONFERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.00
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.00
Automobile radiators	7.25
Zincy bronze borings	7.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.00
Brass pipe	7.25
Old rolled brass	6.75
Admiralty condenser tubes	7.25
Muntz metal condenser tubes	6.75
Plated brass sheet, pipe reflectors	6.25
Manganese bronze solids	7.00*
Manganese bronze solids	6.00*
Manganese bronze borings	6.25*

OPA Group 4†

Refinery brass	4.50*
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*Price varies with analysis. †Lead content 0.00 to 0.40 per cent. ‡Lead content 0.41 to 1.00 per cent.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum*

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	
26S	4.00
turnings, dry basis	3.00
Low copper alloys 51, 52, 61, 63S	
solids	7.25
turnings, dry basis	5.75

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	2.75

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under 1/4%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in 500 lb. lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25 1/4
Electrodeposited	18 1/4
Rolled, oval, straight	19 1/4
Curved	20 1/4
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23 1/4
Zinc, cast, 99.99, 15 in. or longer	16 1/4
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 100 oz. lots, per oz.	80

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls, frt. allowed	13.50
Silver Cyanide, 100 oz. lots, per oz.	0.6083
Sodium cyanide, 96 per cent, domestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	32.00
Zinc sulphate, 89 per cent, crystals, bbls, frt. allowed	6.35

Market Still Firm; Demand Increases

New York

• • • The scrap market continues to operate at ceiling prices, the only changes being reported in Birmingham, where several grades increased, approaching the ceiling. Labor difficulties are still holding back scrapyards from peak operations but consumers are purchasing in order to increase inventories, thus maintaining the price levels.

In contrast to the increasing turnover of termination scrap in the New York area and Government surplus sales in Pittsburgh, Buffalo reports criticism of the slow movement in that area.

Landing mat scrap is becoming an important factor in the Pittsburgh area in particular, selling at \$12.29 to \$12.78 per ton f.o.b. Norfolk, as compared to a high of \$12.07 per ton two weeks ago. Another 12,000 tons of this scrap is to go on sale in Norfolk on Thursday of this week, the price not yet known.

PITTSBURGH—The scrap demand here continues very strong but the supply seems to be keeping up with needs. No price advances have occurred, and no advance in the springboards being paid by consumers has been in evidence. One large consumer here has been taking in sufficient scrap for his needs at a 50¢ a ton springboard. There has been an increase in the amount of unprepared scrap coming into the yards mainly from government surplus sales. Up to now the yards have been able to handle this material but this has been without increases in manpower. Yards here report that there has not been very much of an increase in manpower resulting from service discharges. Considerable quantities of landing mat scrap have been prepared in yards, the preparation consisting mainly of cutting up the 10-ft lengths into electric furnace sizes. Some 10,000 tons of landing mat scrap, sold at Norfolk, brought from \$12.29 to \$12.78 per ton. Youngstown has been taking heavy melting scrap out of Pittsburgh as low phosphorus, paying the premium to get the material.

CHICAGO—Purchase last week of 25,000 tons by the leading consumer at ceiling, principally heavy melting steel but with some bundled machine shop turnings and electric furnace scrap, underlines the firmness of the current market. Mill inventories have suffered from blast furnace shutdowns during the coal strike with openhearth operations maintained at a high level. With scrap shipments continuing at a modest rate, an early onset of cold weather could produce a serious

situation later in the winter. Sellers are keeping a close eye on the possibility of a general steel strike as the major occurrence which could affect present firm market levels. Cast iron continues extremely scarce.

PHILADELPHIA—All mills have now resumed purchasing. Cast scrap and turnings are still short. Large tonnages of unprepared scrap are being offered, mainly government offerings. Much of this material is moving westward. However, scrap yards here that are buying this unprepared scrap are in many cases forced to keep it in their yards without preparing it because of the lack of labor. During the month of October about 55,000 tons of landing mats have been sold here.

DETROIT—Demand continues strong for all grades, and ceiling prices are steadily maintained except for some few three-way alloy grades, on which quotations have run steadily below the market because demand is insufficient to maintain premium prices for alloy content. Tonnage on the November automotive lists, being opened this week, is estimated around half of recent normal quantities. A fair tonnage of sheet clippings is evidenced in these lists, but quantities on turnings grades are well below expectations, adding to the tight situation prevailing on these classes.

BOSTON—The trade has no difficulty in disposing of available scrap, particularly steel and turnings. The rub is that nobody has any appreciable tonnage on hand. Demand for foundry scrap far exceeds supply. Pittsburgh district consumers have placed unsolicited turnings orders here at ceiling prices, November delivery. Shipyard nickel plate scrap is plentiful with no takers.

NEW YORK—All scrap grades remain at ceiling prices. The scrapyards labor situation is still such that turnover is adversely affected, although movement is increasing. The low operating rate in this area would normally indicate slow movement of scrap, but at this time, consumers are buying in order to increase inventories. Navy termination scrap in the area is undergoing a rapid turnover. Landing mat scrap is not entering the market here due to complicated and expensive shipping problems as compared with Norfolk and Boston.

BUFFALO—Criticism of the slow movement of termination scrap into consuming channels grows sharper as demand rises, especially for the openhearth grades. For example, a federal agency recently solicited bids here on 25 lb. [correct] of scrap metal. One solution offered is that small lots sold at the market, without red tape, and the bid-

ding fanfare be reserved for worthwhile amounts. Marine interests report several fleets of scrap making slow progress through the barge canal, due to high water.

CLEVELAND—Prices remain at ceiling here and supplies continue to be more than tight. In addition to the sales made last week, about 12,000 tons of landing mat scrap will be sold at Norfolk, Va., Thursday of this week. A decline in pig iron production because of repairs and because of the recent coal strike is expected to further strengthen the underlying factors supporting a strong scrap market.

ST. LOUIS—With improved weather conditions in the producing area, receipts of scrap iron in the St. Louis industrial district were slightly better than a week earlier. While most of the mills are comfortably situated as to inventories, there has been no break in prices.

CINCINNATI—The district scrap market tends tighter as dealers indicate a strong demand for material, but the supply is none too plentiful. Dealers indicate that desirable material is being moved almost as fast as they can get it, but that some items, particularly low-phosphorus scrap, is not in great demand. Shortage of pig iron supplies and the desires of melters to increase scrap content of the cupola is reported to be largely responsible for the tight condition of the market, although dealers indicate also that steel mills are becoming more interested in increasing their inventories.

BIRMINGHAM—All blast furnace grades have advanced in price here with cast iron borings and shoveling turnings bringing ceiling prices. The latter item is a scarce commodity, however, with shell plants idle following contract terminations. The market is still strong on openhearth material with freight springboard averaging \$1 per ton being allowed on all openhearth grades except No. 2 bundles.

TORONTO—No improvement was reported in the scrap iron and steel situation during the week. Insofar as dealers are concerned only small quantities are moving due to difficulty in obtaining supplies for consumer requirements. However, steel mills do not appear greatly disturbed over the prevailing situation and these big consumers have been successful in gathering in good tonnages of scrap from War Assets Corp., but there has been a slowing down in deliveries from industrial plants. Unprepared scrap from farm communities is not running as heavy in volume as in previous years, and dealers report receipts barely sufficient to keep yard crews working. Various types of iron scrap are scarce and many melters now are resorting more extensively to pig iron in their daily melt. Prices are mostly at ceiling levels.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bld. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	\$14.50 to 15.00
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings	16.00*
Hvy. break cast.	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	18.75*
Galv. bundles	16.75*
Mach. shop turn.	13.75*
Short shovels, turn.	15.75*
Cast iron borings	14.75*
Mix. borings & turn.	13.75*
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	\$22.75 to 23.25
Cut bolsters & side frames	20.25 to 20.75
Angles & splice bars	22.25*
Standard stl. car axles	24.00 to 24.50
No. 3 steel wheels	22.25*
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast.	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	\$10.50 to 11.00
Shovelling turn.	12.50 to 13.00
Cast iron borings	11.50 to 12.00
Mixed bor. & turn.	11.50 to 12.00
Low phos. plate	22.00*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Scrap rails	21.00*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	\$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovellings	12.05*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
CI'n cast, chem. bor.	\$13.06 to 14.15*

Truck delivery to foundry

Machinery cast.	21.00 to 22.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 22.51*

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	\$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	12.32*
Short shov. turn.	14.32*

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Where asterisks are used on quotations below, this indicates a ceiling price to which must be added brokerage fee and adjusted freight.

Cast iron borings	13.32*
Mixed bor. & turn.	12.32*
Low phos. plate	19.32*
No. 1 cupola cast.	20.00*
Charging box cast.	19.00*
Hvy. breakable cast.	16.50*
Stove plate	19.00*
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$18.75*
No. 2 hvy. melting	18.75*
No. 2 bundles	18.75*
Mach. shop turn.	13.75*
Shovelling turn.	15.75*
Cast iron borings	\$13.50 to 14.00
Mixed bor. & turn.	13.75*
No. 1 cupola cast.	20.00*
Hvy. breakable cast.	16.50*
Cast, charging box	19.00*
Hvy. axle forge turn.	18.25*
Low phos. plate	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels	23.25*
RR. coil springs	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	\$17.50*
Bundled sheets	17.50*
Mach. shop turn.	\$9.00 to 9.50
Locomotive tires, uncut.	14.00*
Misc. std. sec. rails	19.00*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	21.00 to 21.50
Steel car axles	21.00 to 21.50
Stove plate	19.00*
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	20.00*
No. 1 mach'ery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$17.00*
No. 2 hvy. melting	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	\$10.50 to 11.00
Shovelling turnings	14.00*
Cast iron borings	13.00*
Bar crops and plate	18.00 to 18.50
Structural and plate	18.00 to 18.50
No. 1 cast	20.00*
Stove plate	19.00*
Steel axles	18.50*
Scrap rails	18.50*
Rerolling rails	20.50*
Angles & splice bars	20.50 to 21.00
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$20.00*
No. 2 hvy. melting	20.00*
Low phos. plate	22.50*
No. 1 busheling	20.00*
Hydraulic bundles	20.00*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Cast iron borings	16.00*

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	\$15.32*
No. 2 hvy. melting	15.32*
Comp. black bundles	15.32*
Comp. galv. bundles	13.32*
Mach. shop turn.	10.32*
Mixed bor. & turn.	10.32*
Shovelling turn.	12.32*
No. 1 cupola cast.	20.00*

Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast.	20.00*
Unstrip. motor bldgs.	17.50*
CI'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	14.25*
Shovelling turn.	16.25*
Cast iron borings	14.25*
Cast iron borings	15.25*
Mixed bor. & turn.	14.25*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	22.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	22.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00*
No. 3 bundles	19.50*
Mach. shop turn.	14.50*
Short shovel	16.50*
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	22.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting	\$15.50 to \$16.25
No. 1 hvy. melting	15.50 to 16.25
No. 2 hvy. melting	14.50 to 15.25
No. 3 bales	13.00 to 13.75
No. 3 bales	9.50 to 10.25
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$12.00 to \$14.00
No. 2 hvy. melting	12.00 to 13.00
No. 2 bales	1.00 to 12.00
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	\$10.00
No. 1 & No. 2 hvy. melting	10.00
Elec. furn. 1 ft. und.	\$14.00 to 15.00
No. 1 cupola cast.	20.00*

TORONTO

Per gross ton delivered to consumer:

Heavy melting	\$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushellings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Mill run sheet, 10¢ per 100 lb under base; primes, 25¢ above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb. to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6. (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15¢ per lb higher.

Basing Points													DELIVERED TO		
	Pitts- burgh	Chicago	Gary	Cleveland	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	Detroit	New York	Phila- delphia
INGOTS															
Carbon, rerolling															
(31.00 f.o.b. mill)															
Carbon, forging	\$36	\$36	\$36	\$36	\$36	\$36	\$36								
Alloy	\$45	\$45				\$45									
(Bethlehem, Massillon, Canton, Coatesville—\$45)															
BILLETS, BLOOMS, SLABS															
Carbon, rerolling	\$36	\$36	\$36	\$36	\$36	\$36	\$36	\$36				\$48 ¹⁴	\$38		
(Provo—\$47.20, Duluth—\$38 ¹⁴)															
Carbon, forging	\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$42				\$54 ¹⁴	\$44		
(Provo—\$53.20, Duluth—\$44 ¹⁴)															
Alloy	\$54	\$54				\$54							\$56		
(Bethlehem, Massillon, Canton—\$56)															
SHEET BARS	\$36	\$36		\$36		\$36	\$36	\$36							
(Canton—\$36)															
PIPE SKELP	1.90¢	1.90¢					1.90¢	1.90¢							
(Coatesville—1.90¢)															
WIRE RODS¹⁵ No. 5 to 9/32 in.	2.15¢	2.15¢		2.15¢	2.15¢						2.40¢	2.65¢			
(Worcester—2.25¢)															
SHEETS															
Hot-rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold-rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.70¢	3.70¢	3.70¢		3.70¢	3.70¢	3.70¢	3.70¢	3.80¢	3.70¢		4.25¢		3.94¢	3.87¢
Enameling (20 gage)	3.45¢	3.45¢	3.45¢	3.45¢			3.45¢		3.55¢	3.45¢		4.10¢	3.55¢	3.81¢	3.77¢
Long ternes ²	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot-rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold-rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢						2.90¢	3.16¢	
(Worcester—3.00¢)															
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity cold-rolled	2.95¢	3.05¢		2.95¢			2.95¢						3.05¢	3.31¢	
(Worcester—3.35¢)															
TINPLATE															
Standard cokes, base box	\$5.00	\$5.00	\$5.00						\$5.10					\$5.36	\$5.32
Electro, box	{ 0.25 lb	\$4.35	\$4.35	\$4.35											
	{ 0.50 lb	\$4.50	\$4.50	\$4.50					\$4.60						
	{ 0.75 lb	\$4.65	\$4.65	\$4.65					\$4.75						
BLACKPLATE 29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ¹¹			3.37¢
TERNES, MFG. Special coated, base box	\$4.30	\$4.30	\$4.30						\$4.40						
BARS															
Carbon steel	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		(Duluth—2.35¢, Provo, Utah \$2.95)		2.60¢	2.90¢	2.35¢	2.59¢	2.57¢
Rail steel ⁶	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢					2.60¢	2.90¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold-finished ⁸	2.75¢	2.75¢	2.75¢	2.75¢		2.75¢			(Detroit—2.80¢)	(Toledo—2.90¢)				3.09¢	3.07¢
Alloy, hot-rolled	2.70¢	2.70¢				2.70¢	2.70		(Bethlehem, Massillon, Canton—2.70¢)				2.80¢		
Alloy, cold-drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES															
Carbon steel ¹³	2.25¢	2.25¢	2.25¢	2.25¢	2.25¢		2.25¢		(Coatesville and Claymont—2.25¢, Provo, Utah \$2.95)		2.60¢	2.90¢	2.47¢	2.44¢	2.30¢
Floor plates	3.50¢	3.50¢									3.85¢	4.15¢		3.86¢	3.82¢
Alloy	3.50¢	3.50¢							(Coatesville—3.50¢)		3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem—2.10¢)		2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 carbon	2.80¢			2.80¢					(Worcester—3.00¢)						
0.51 to 0.75 carbon	4.30¢			4.30¢					(Worcester—4.50¢)						
0.76 to 1.00 carbon	6.15¢			6.15¢					(Worcester—6.35¢)						
1.01 to 1.25 carbon	8.35¢			8.35¢					(Worcester—8.55¢)						
WIRE⁹															
Bright ¹²	2.75¢	2.75¢		2.75¢	2.75¢				(Worcester—2.85¢)	(Duluth—2.80¢)		3.25¢			3.07¢
Galvanized									Add proper size extra and galvanizing extra to Bright Wire base						
Spring (high carbon)	3.35¢	3.35¢		3.35¢					(Worcester—3.45¢)			3.85¢			3.67¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

PRICES

CORROSION AND HEAT RESISTANT STEELS

BASING POINT

	Straight Chromium		Chromium Nickel			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	cents per pound		cents per pound			
Blooms, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Balt.	Subject to negotiation		Subject to negotiation			
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	21.25	20.40	15.725	16.15	19.125	23.375
Billets, P'gh, Chi, Canton, Newark, N. J., Watervliet, Syracuse, Balt.	21.25	20.40	15.725	16.15	19.125	23.375
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Newark, N. J., Ft. Wayne, Titusville	Subject to negotiation		Subject to negotiation			
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	21.25	20.40	15.725	16.15	19.125	23.375
Bars, c-r, P'gh, Chi, Cleve, Canton, Dunkirk, Newark, N. J., Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	25.00	24.00	19.90	19.00	22.50	27.50
Plates, P'gh, Middletown, Canton	25.00	24.00	19.90	19.00	22.50	27.50
Shapes, structural, P'gh, Chi	29.00	27.00	21.50	22.00	26.50	30.50
Sheets, P'gh, Chi, Middletown, Canton, Balt	25.00	24.00	19.90	19.00	22.50	27.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	36.00	34.00	28.50	29.00	32.50	36.50
Strip, c-r, P'gh, Cleve, Newark, N. J., Reading, Canton, Youngstown	23.50	21.50	17.00	17.50	24.00	28.00
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila.	30.00	28.00	22.00	22.50	32.00	32.00
Wire flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton	25.00	24.00	18.50	19.00	22.50	27.50
Rod, h-r, Newark, N. J., Syracuse	30.00	28.00	22.00	22.50	32.00	32.00
Tubing, seamless, P'gh, Chi, Canton, (4 in. to 6 in.)	25.00	24.00	18.50	19.00	22.50	27.50
	66.63	66.63		63.30		

SHELL STEEL

	per gross ton
3 in. to 12 in.	\$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic openhearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are \$2.00 higher; East Michigan, \$3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at \$13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of \$52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	per lb.
Field grade	3.30¢
Armature	3.65¢
Electrical	4.15¢
Motor	5.05¢
Dynamo	5.75¢
Transformer 72	6.25¢
Transformer 65	7.25¢
Transformer 58	7.75¢
Transformer 52	8.55¢

F.o.b. Granite City, add 10¢ per 100 lb. on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb. on all grades.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk)

	base per lb.
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57½¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices east of Mississippi are 2¢ per lb. higher; west of Mississippi 3¢ higher.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., gross ton	\$43.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	per gross ton
Light rails (from billets)	\$45.00
Light rails (from rail steel)	44.00

	base per lb.
Cut spikes	3.25¢
Screw spikes	5.40¢
Tie plate, steel	2.30¢
Tie plates, Pacific Coast	2.45¢
Track bolts	4.75¢
Track bolts, heat treated, to railroads	5.00¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25¢.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points	Pacific Coast
Standard wire nails	\$2.90	\$3.40
Coated nails	2.90	3.40
Cut nails, carloads	3.85	

	base per 100 lb.
Annealed fence wire	\$3.05
Annealed galv. fence wire	3.40

	base column
Woven wire fence*	67
Fence posts, carloads..	69
Single loop bale ties..	66
Galvanized barbed wire**	72
Twisted barbless wire..	72

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless-clad		
No. 304, 20 pct, f.o.b. Pittsburgh	18.00*	19.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	18.00	
Inconel-clad		
10 pct, f.o.b. Coatesville..	25.00	
Monel-clad		
10 pct, f.o.b. Coatesville..	24.00	
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh		9.00

*Includes annealing and pickling.

ALLOY EXTRAS

Alloy Steel	Basic Openhearth		Electric Furnace	
	Bars and Bar-strip	Billets, Blooms, and Slabs	Bars and Bar-strip	Billets, Blooms, and Slabs
NE 8800	0.65¢	\$13.00	\$1.15	\$23.00
NE 8700	0.70	14.00	1.20	24.00
NE 9400	0.75	16.00	1.25	25.00
NE 9700	0.65	13.00	1.15	23.00
NE 9800	1.30	26.00	1.60	36.00
NE 9900	1.20	24.00	1.55	31.00

The extras shown are in addition to the base price of \$2.70 per 100 lb on finished products and \$54 per gross ton on semifinished steel, major basing points, as shown in table, opposite page, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. When acid openhearth is specified and acceptable, add to basic openhearth alloy differential 0.25¢ per lb for bars and bar-strip and \$5 per gross ton for billets, blooms and slabs.

PRICES

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills
(F.o.b. Pittsburgh only on wrought pipe)
base price—\$200.00 per net ton

Steel (butt weld)	Black	Galv.
1/2-in.	63 1/2	51
3/4-in.	66 1/2	55
1-in. to 3-in.	68 1/2	57 1/2

Wrought Iron (butt weld)		
1/2-in.	24	3 1/2
3/4-in.	30	10
1-in. and 1 1/4-in.	34	16
1 1/2-in.	38	18 1/2
2-in.	37 1/2	18

Steel (lap weld)		
2-in.	61	49 1/2
2 1/2-in. and 3-in.	64	52 1/2
3 1/2-in. to 6-in.	66	54 1/2

Wrought Iron (lap weld)		
2-in.	30 1/2	12
2 1/2-in. to 3 1/2-in.	31 1/2	14 1/2
4-in.	33 1/2	18
4 1/2-in. to 8-in.	32 1/2	17

Steel (butt, extra strong, plain ends)		
1/2-in.	61 1/2	50 1/2
3/4-in.	65 1/2	54 1/2
1-in. to 3-in.	67	57

Wrought Iron (same as above)		
1/2-in.	25	6
3/4-in.	31	12
1-in. to 2-in.	38	19 1/2

Steel (lap, extra strong, plain ends)		
2-in.	59	48 1/2
2 1/2-in. and 3-in.	63	52 1/2
3 1/2-in. to 6-in.	66 1/2	56

Wrought Iron (same as above)		
2-in.	33 1/2	15 1/2
2 1/2-in. to 4-in.	39	22 1/2
4 1/2-in. to 6-in.	37 1/2	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

BOILER TUBES

Seamless steel and lap weld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots.

	Seamless	Lap weld, Cold-Drawn	Hot-Rolled
2 in. O.D. 13 B.W.G.	15.03	13.04	12.38
2 1/2 in. O.D. 12 B.W.G.	20.21	17.54	16.58
3 in. O.D. 12 B.W.G.	22.48	19.50	18.35
3 1/2 in. O.D. 11 B.W.G.	28.37	24.62	23.15
4 in. O.D. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)	
40,000 lb or ft and over	Base
30,000 lb or ft to 39,999 lb or ft	5 pct
20,000 lb or ft to 29,999 lb or ft	10 pct
10,000 lb or ft to 19,999 lb or ft	20 pct
5,000 lb or ft to 9,999 lb or ft	30 pct
2,000 lb or ft to 4,999 lb or ft	45 pct
Under 2,000 lb or ft	65 pct

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	\$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20
Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle. Delivered prices do not reflect 3 pct tax on freight rates.	

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Base discount less case lots	Percent Off List
1/2 in. & smaller x 6 in. & shorter	65 1/2
9/16 & 5/8 in. x 6 in. & shorter	63 1/2
3/4 to 1 in. x 6 in. & shorter	61
1 1/4 in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Flow bolts	65

Nuts, Cold Punched or Hot Pressed (Hexagon or Square)

1/2 in. and smaller	62
9/16 to 1 in. inclusive	59
1 1/4 to 1 1/2 in. inclusive	57
1 1/2 in. and larger	56
On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.	

Semifin. Hexagon Nuts U.S.S. S.A.E.

Base discount less keg lots	
7/16 in. and smaller	64
1/2 in. and smaller	62
1/2 in. through 1 in.	60
9/16 in. through 1 in.	59
1 1/4 in. through 1 1/2 in.	57
1 1/2 in. and larger	56
In full keg lots, 10 pct additional discount.	

Stove Bolts

Consumer	
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80
On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.	

Large Rivets

(1/2 in. and larger)	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$3.75

Small Rivets

(7/16 in. and smaller)	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

Consumer	Percent Off List
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points 71	
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51
Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.	

FLUORSPAR

Maximum price f.o.b. consumer's plant, \$30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Div. certifies in writing the consumers need for one of the higher grades of metallurgical fluor spar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF ₂ Content:	Base price per short ton
70% or more	\$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, cents per lb, ton lots.	
Copper, electrolytic, 150 and 200 mesh	21 1/2¢ to 23 1/2¢
Copper, reduced, 150 and 200 mesh	20 1/2¢ to 25 1/2¢
Iron, commercial, 100 and 200 mesh 96 + % Fe	12 1/2¢ to 15¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98 1/2 + % Fe, drum lots	63¢
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe 30 to 33¢	
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢
Aluminum, 100 and 200 mesh	*25¢
Antimony, 100 mesh	30¢
Cadmium, 100 mesh	\$1.40
Chromium, 100 mesh and finer	\$1.25
Lead, 100, 200 & 300 mesh	11 1/2¢ to 15¢
Manganese	65¢
Nickel, 150 mesh	51 1/2¢
Solder powder, 100 mesh	8 1/2¢ plus metal
Tin, 100 mesh	58 1/2¢
Tungsten metal powder, 98%	
99%, any quantity, per lb	\$2.60
Molybdenum powder, 99%, in 200-lb kegs, f.o.b. York, Pa., per lb	\$2.60
Under 100 lb	\$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	\$7.50*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	9.00
Foundry, Byproduct	
Chicago, del'd	13.75
Chicago, f.o.b.	13.00
New England, del'd	14.65
Kearny, N. J., f.o.b.	13.05
Philadelphia, del'd	13.28
Buffalo, del'd	13.40
Portsmouth, Ohio, f.o.b.	11.50
Painesville, Ohio, f.o.b.	12.15
Erie, del'd	13.15
Cleveland, del'd	13.20
Cincinnati, del'd	13.35
St. Louis, del'd	14.25
Birmingham, del'd	10.90
*Hand drawn ovens using trucked coal permitted to charge \$8.60 per ton plus transportation charges.	

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	Per 1000
Super-duty brick, St. Louis	\$68.50
First quality, Pa., Md., Ky., Mo., Ill.	54.40
First quality, New Jersey	59.35
Sec. quality, Pa., Md., Ky., Mo., Ill.	49.35
Sec. quality, New Jersey	51.95
No. 1 Ohio	45.60
Ground fire clay, net ton	8.05

Silica Brick	
Pennsylvania and Birmingham	\$54.40
Chicago District	62.45
Silica cement, net ton (Eastern)	9.55

Chrome Brick	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	\$54.00

Magnesite Brick	
Standard, Balt. and Chester	\$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	\$43.48
Domestic, f.o.b. Chewelah, Wash. in bulk	22.00
in sacks	26.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer, 51.50	\$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35
*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.	

PRICES

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are soned warehouse prices in conformance with latest soning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates 1/4 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	\$3.518	\$4.872 ³	\$4.768 ^a	\$3.922	\$4.772	\$3.905	\$3.986	\$3.822	\$4.172	\$5.616	\$6.986	\$7.072	\$8.172
New York	3.59	4.613 ³	5.110	3.974 ⁶	4.772	3.768	3.758	3.853	4.203	5.858	6.906	7.103	8.203
Boston	3.744	4.744 ⁶	5.224 ⁶	4.106	4.715	3.912	3.912	4.044	4.244	6.012	7.062	7.194	8.394
Baltimore	3.394	4.852	4.994	3.902	4.752	3.594	3.759	3.802	4.152	.....	.....	.....	.....
Norfolk	3.771	4.965	5.371	4.165	4.965	3.971	4.002	4.065	4.265	.....	.....	.....	.....
Chicago	3.25	4.20	5.231	3.60	4.651 ⁷	3.55	3.55	3.50	3.85	5.60	6.65	6.65	7.90
Milwaukee	3.387	4.337 ³	5.272 ⁴	3.737	4.787 ¹⁷	3.687	3.687	3.637	3.987	5.837	6.887	6.887	7.987
Cleveland	3.35	4.40	4.874 ⁴	3.60	4.45	3.40	3.588	3.35	3.85	5.906	6.856	6.85	7.75
Buffalo	3.35	4.40	4.75 ⁴	3.819	4.689	3.63	3.40	3.35	3.85	5.90	6.85	6.85	7.75
Detroit	3.45	4.50	5.00 ⁴	3.70	4.859 ¹⁷	3.609	3.661	3.45	3.90	5.93	6.98	6.989	8.059
Cincinnati	3.425	4.475 ³	4.825 ⁴	3.675	4.711	3.661	3.691	3.611	4.111	5.95	7.00	7.011	8.261
St. Louis	3.397	4.347 ³	5.172 ⁴	3.747	4.931 ¹⁷	3.697	3.697	3.647	4.131	5.981	7.031	7.031	8.131
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.85	5.90	6.85	6.85	7.90
St. Paul	3.50	4.46	5.257 ⁴	3.86	5.102 ¹⁷	3.811 ³	3.811 ³	3.761 ³	3.461	5.94	5.99	7.361	8.461
Omaha	3.665	5.443	5.608 ⁴	4.215	.....	4.165	4.165	4.115	4.543	.....	.....	.....	.....
Indianapolis	3.518	4.568	4.918	3.768	4.741	3.63	3.63	3.58	4.00	5.93	6.98	6.98	8.23
Birmingham	3.45	4.66	4.75	3.70	.....	3.55	3.55	3.50	4.53	.....	.....	.....	.....
Memphis	3.985 ⁷	4.66	5.298	4.215	.....	4.065	4.065	4.015	4.33	.....	.....	.....	.....
New Orleans	4.058 ⁶	5.079	5.358	4.308	.....	4.158	4.158 ⁶	4.108 ⁶	4.729	.....	.....	.....	.....
Houston	3.783	5.573	6.313 ¹	4.313	.....	4.25	4.25	3.75	6.473 ³	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20 ³	6.10 ⁴	4.95	5.613 ¹⁵	4.95	4.65	4.40	5.683	8.204	9.404	9.404	10.454
San Francisco	4.551 ⁴	7.30 ⁴	6.35 ⁴	4.501 ⁴	7.333 ¹⁷	4.651 ⁴	4.351 ⁴	4.151 ⁴	5.433	8.304	9.404	9.404	10.454
Seattle	4.651 ²	7.05 ⁴	5.95 ⁴	4.251 ²	.....	4.751 ²	4.451 ²	4.351 ²	5.883	.....	9.404	9.404	.....
Portland	4.651 ¹	6.60 ⁴	5.75 ⁴	4.751 ¹	.....	4.851 ¹	4.451 ¹	4.451 ¹	5.633	8.304	9.404	8.304	9.404
Salt Lake City	4.530 ¹⁷	.....	6.171 ³	5.531 ⁷	.....	4.981 ⁷	4.981 ⁷	4.881 ⁷	6.00	.....	.....	.....	.....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1499 lb; strip, extras on all quantities; bars, 1500 lb base.

NE ALLOY BARS: 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 199 lb. (7) 400 to 1499 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb and over. (15) 1000 lb and over. (16) 1500 lb and over. (17) 2000 lb and over. (18) 3500 lb and over.

(*) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271¢ for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

* Maximum per gross ton, established by OPA Oct. 22, 1945.
† Prices do not reflect 3 pct tax on freight.

BASING POINT PRICES

Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	\$26.25	\$26.75	\$27.25	\$27.75	\$31.25
Birdsboro	26.25	26.75	27.25	27.75	31.25
Birmingham	20.75	22.13	26.25	26.75	31.25
Buffalo	24.75	25.75	26.25	26.75	31.25
Chicago	25.25	25.75	25.75	26.25	31.25
Cleveland	25.25	25.75	25.75	26.25	31.25
Detroit	25.25	25.75	25.75	26.25	31.25
Duluth	25.75	26.25	26.25	26.75	31.25
Erie	25.25	25.75	26.25	26.75	31.25
Everett	26.25	26.75	27.25	27.75	31.25
Granite City	25.25	25.75	25.75	26.25	31.25
Hamilton	25.25	25.75	25.75	26.25	31.25
Neville Island	25.25	25.75	25.75	26.25	31.25
Provo	23.25	23.75	25.75	26.25	31.25
Sharpsville	25.25	25.75	25.75	26.25	31.25
Sparrows Point	26.25	26.75	27.25	27.75	31.25
Steelton	26.25	26.75	27.25	27.75	31.25
Swedeland	26.25	26.75	27.25	27.75	31.25
Toledo	25.25	25.75	25.75	26.25	31.25
Youngstown	25.25	25.75	25.75	26.25	31.25

DELIVERED PRICES (BASE GRADES)

Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	\$.50	\$26.75	\$27.25	\$27.75	\$28.25	\$36.27
Boston	Birdsboro-Steelton	4.02	26.75	29.25	29.75	30.25	34.17
Brooklyn	Bethlehem	2.50	26.75	29.25	29.75	30.25	34.17
Brooklyn	Birdsboro	2.92	26.75	29.25	29.75	30.25	34.17
Canton	Cleveland	1.39	26.64	27.14	27.14	27.64	34.44
Canton	Buffalo	3.19	26.64	27.14	27.14	27.64	34.44
Cincinnati	Birmingham	4.06	24.81	26.19	26.19	26.69	35.65
Cincinnati	Hamilton	1.11	24.81	26.19	26.19	26.69	35.65
Cincinnati	Buffalo	4.40	24.81	26.19	26.19	26.69	35.65
Jersey City	Bethlehem	1.53	27.78	28.28	28.28	28.78	33.19
Jersey City	Birdsboro	1.94	27.78	28.28	28.28	28.78	33.19
Los Angeles	Provo	4.95	26.20	26.70	26.70	27.20	46.66
Los Angeles	Buffalo	15.41	26.20	26.70	26.70	27.20	46.66
Mansfield	Cleveland & Toledo	1.94	27.19	27.69	27.69	28.19	34.63
Mansfield	Buffalo	3.36	27.19	27.69	27.69	28.19	34.63
Philadelphia	Swedeland	.84	27.09	27.59	27.59	28.09	32.49
Philadelphia	Birdsboro	1.24	27.09	27.59	27.59	28.09	32.49
San Francisco	Provo	4.95	26.20	26.70	26.70	27.20	46.66
San Francisco	Buffalo	15.41	26.20	26.70	26.70	27.20	46.66
Seattle	Provo	4.95	26.20	26.70	26.70	27.20	46.66
Seattle	Buffalo	15.41	26.20	26.70	26.70	27.20	46.66
St. Louis	Granite City	.50	25.75	26.25	26.25	26.75	38.32
St. Louis	Buffalo	7.07	25.75	26.25	26.25	26.75	38.32

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50¢ a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, \$33.00 and \$34.00, respectively. Newberry Brand of Lake Superior charcoal iron \$39.00 per g.t., f.o.b. furnace, by order L 39 to RPS 10. Apr. 11, 1945, retroactive to Mar. 7, 1945. Delivered to Chicago, \$42.34. High phosphorus

iron sells at Lyles, Tenn., at \$28.50.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50¢ a ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); Phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; Manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. Effective Mar. 3, 1943, \$2 per ton extra

may be charged for 0.5 to 0.75 pct nickel content and \$1 per ton extra for each additional 0.25 pct nickel.

Silvery iron and bessemer ferrosilicon up to and including 14.00 pct silicon covered by RPS 10 as amended Feb. 14, 1945. Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—\$30.50; f.o.b. Buffalo—\$31.75. Add \$1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add \$1.00 per ton for prices of comparable analysis.

FERROALLOY PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn. Carload lots (bulk) \$135.00 Less ton lots (packed) 148.50 F.o.b. Pittsburgh 139.50 \$1.70 for each 1% above 82% Mn; penalty, \$1.70 for each 1% below 78%.

Ferromanganese Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66% contained Mn. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk ..	6.05¢	6.30¢	6.60¢
Ton lots	6.65¢	7.55¢	8.55¢
Less ton lots ..	6.80¢	7.80¢	8.80¢

Manganese Metal

Contract basis, lump size, per pound of metal, f.o.b. shipping point with freight allowed. Spot sales add 2¢ per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.	
Carload, bulk	36¢
L.c.l. lots	38¢
95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.	
Carload, bulk	34¢
L.c.l.	35¢

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	34¢
Ton lots	36¢
Less ton lots	38¢

High purity manganese containing 0.06% C and 0.06% P, over 90% Mn, per pound containing Mn 23¢

Spiegeleisen

Maximum base contract prices per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn	19-21% Mn
Carloads	\$35.00	\$36.00
Less ton	47.50	48.50
F.o.b. Pittsburgh, Chicago	40.00	

Low-Carbon Ferromanganese

Contract prices per pound of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, eastern zone. Add 0.25¢ for spot sales.

	Carloads	Ton	Less
0.10% max. C, 1% or 2% max. Si...	23.00¢	23.40¢	23.65¢
0.15% max. C, 1% or 2% max. Si...	22.00¢	22.40¢	22.65¢
0.30% max. C, 1% or 2% max. Si...	21.00¢	21.40¢	21.65¢
0.50% max. C, 1% or 2% max. Si...	20.00¢	20.40¢	20.65¢
0.75% max. C, 7.00% max. Si...	16.00¢	16.40¢	16.65¢

Electric Ferrosilicon

OPA maximum base price cents per pound contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

	Eastern	Central	Western
50% Si	6.65¢	7.10¢	7.25¢
75% Si	8.05¢	8.20¢	8.75¢
80-90% Si	8.90¢	9.05¢	9.55¢
90-95% Si	11.05¢	11.20¢	11.65¢

Silvery Iron

Si 14.01 to 14.50%, \$45.50 per G. T. f.o.b. Jackson, Ohio. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%. Covered by MPR 405.

Silicon Metal

OPA maximum base price per pound of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb, packed. Add 0.25¢ for spot sales.

	Eastern	Central	Western
96% Si, 2% Fe ..	13.10¢	13.55¢	16.50¢
97% Si, 1% Fe ..	13.45¢	13.90¢	16.80¢

Ferrosilicon Briquets

OPA maximum base price per pound of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add 25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk ..	3.35¢	3.50¢	3.65¢
2000 lb-carload ..	3.80¢	4.20¢	4.25¢

Silicomanganese

Contract basis lump size, per pound of metal, f.o.b. shipping point with freight allowed. Add 25¢ for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05¢
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2000 lb to carload	6.70¢
Briquet, contract basis, carlots, bulk freight allowed, per lb	5.80¢
2000 lb to carload	6.30¢
Less ton lots	6.55¢

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per pound of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add 0.25¢ per lb contained Cr for spot sales.

	Eastern	Central	Western
0.06% C	23.00¢	23.40¢	24.00¢
0.10% C	22.50¢	22.90¢	23.50¢
0.15% C	22.00¢	22.40¢	23.00¢
0.20% C	21.50¢	21.90¢	22.50¢
0.50% C	21.00¢	21.40¢	22.00¢
1.00% C	20.50¢	20.90¢	21.50¢
2.00% C	19.50¢	19.90¢	21.00¢
66-71% Cr, 4-10% C	13.00¢	13.40¢	14.00¢
62-66% Cr, 5-7% C	13.50¢	13.90¢	14.50¢

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

Ferrochrome Briquets

Contract prices per pound of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60% contained chromium. Add 0.25¢ for spot sales.

	Eastern	Central	Western
Carload, bulk ..	8.25¢	8.55¢	8.95¢
Ton lots	8.75¢	9.25¢	10.75¢
Less ton lots ..	9.00¢	9.50¢	11.00¢

Calcium-Manganese-Silicon

Contract prices per pound of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

	Eastern	Central	Western
Carloads	15.50¢	16.00¢	18.05¢
Ton lots	16.50¢	17.35¢	19.10¢
Less ton lots ..	17.00¢	17.35¢	19.60¢

Calcium Metal

Eastern zone contract prices per pound of metal, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. Add 0.9¢ for central zone; 0.49¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	\$1.80	\$2.30	\$5.00
Less ton lots ..	2.30	2.80	5.75

Chromium-Copper

Contract price per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2¢ for spot sales.

Shot or ingot 45¢

Ferroboron

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination. Add 5¢ for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Ton lots	\$1.20	\$1.2075	\$1.229
Less ton lots ..	1.30	1.3075	1.329

Manganese-Boron

Contract prices per pound of alloy, f.o.b. shipping point, freight charges allowed. Add 5¢ for spot sales.

	Eastern	Central	Western
75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.			
Ton lots	\$1.89	\$1.903	\$1.935
Less ton lots ..	2.01	2.023	2.055

Nickel-Boron

Spot and contract prices per pound of alloy, f.o.b. shipping point, freight allowed to destination.

15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

	Eastern	Central	Western
11,200 lb or more	\$1.90	\$1.9125	\$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots ..	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, standard grade lump or ¼X down, packed f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per pound contained tungsten, 10,000 lb or more.... \$1.90

Ferrovandium, 35-55%, contract basis, f.o.b. plant, usual freight allowances, per pound contained V.

Openhearth \$2.70
Crucible \$2.30
Primos \$2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producers plant, usual freight allowances, per pound of cobalt metal \$1.50

Vanadium pentoxide, 88-92% V₂O₅ technical grade, contract basis, any quantity, per pound contained V₂O₅. Spot sales add 5¢ per lb contained V₂O₅..... \$1.10

Silicaz No. 3, contract basis, f.o.b. plant with usual freight allowances, per pound of alloy.

Carload lots 25¢
2000 lb to carload 26¢

Silvaz No. 3, contract basis, f.o.b. plant with freight allowances, per pound of alloy.

Carload lots 58¢
2000 lb to carload 59¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb and over, max. based on rate to St. Louis

No. 1 87.5¢
No. 6 60¢
No. 79 45¢

Bortram, f.o.b. Niagara Falls
Ton lots, per lb 45¢
Less ton lots, per lb 50¢

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per pound contained Cb.

2000-lb lots \$2.25
Under 2000-lb lots \$2.30

Ferrotitanium, 40-45%, 0.10% C, max. f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti

Less ton lots \$1.23
Less ton lots \$1.25

Ferrotitanium, 20-25%, 0.10% C, max., ton lots, per pound contained titanium \$1.35
Less ton lots \$1.40

High-carbon ferrotitanium, 15-20%, 6-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi, north of Baltimore and St. Louis, per carload \$142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with \$3 unitage freight equalled with Rockdale, Tenn., per gross ton \$58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage freight equalized with Nashville, per gross ton \$75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per pound contained Mo. 95¢

Calcium molybdate, 40-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per pound contained Mo. 80¢

Molybdenum oxide briquets, 48-52% Mo f.o.b. Langeloth, Pa., per pound contained Mo. 80¢

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo. 80¢

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per pound of alloy. Add ¼¢ for spot sales

Carload lots 14¢
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per pound of alloy

Carload, bulk 4.60¢
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk 5.75¢
Ton lots 7.25¢
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per pound.

Car lots 8.00¢
Ton lots 8.75¢
Less ton lots 9.25¢

Comparison of Prices . .

Advances over past week in Heavy Type; declines in Italics. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(cents per pound)				
Hot-rolled sheets	2.20	2.20	2.20	2.10
Cold-rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.70	3.70	3.70	3.50
Hot-rolled strip	2.10	2.10	2.10	2.10
Cold-rolled strip	2.80	2.80	2.80	2.80
Plates	2.25	2.25	2.25	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c-r strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terneplate:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(dollars per base box)				
Tinplate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tinplate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(cents per pound)				
Merchant bars	2.25	2.25	2.25	2.15
Cold-finished bars	2.75	2.75	2.75	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40

Wire and Wire Products:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(cents per pound)				
Bright wire	2.75	2.75	2.75	2.60
Wire nails	2.90	2.90	2.90	2.55

Rails:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(dollars per gross ton)				
Heavy rails	\$43.00	\$43.00	\$43.00	\$40.00
Light rails	45.00	45.00	45.00	40.00

Semifinished Steel:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(dollars per gross ton)				
Rerolling billets	\$36.00	\$36.00	\$36.00	\$34.00
Sheet bars	36.00	36.00	36.00	34.00
Slabs, rerolling	36.00	36.00	36.00	34.00
Forging billets	42.00	42.00	42.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(cents per pound)				
Wire rods	2.15	2.15	2.15	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(per gross ton)				
No. 2 foundry, Phila.	\$27.59	\$27.59	\$26.84	\$25.84
No. 2, Valley furnace	25.75	25.75	25.00	24.00
No. 2, Southern, Cin'ti	26.19	26.19	25.44	24.44
No. 2, Birmingham	22.13	22.13	21.38	20.38
No. 2 foundry, Chicago†	25.75	25.75	25.00	24.00
Basic, del'd eastern Pa.	27.09	27.09	26.34	25.34
Basic, Valley furnace	25.25	25.25	24.50	23.50
Malleable, Chicago†	25.75	25.75	25.00	24.00
Malleable, Valley	25.75	25.75	25.00	24.00
L. S. charcoal, Chicago	42.34	42.34	42.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60¢ per ton.
‡ For carlots at seaboard.

Scrap:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(per gross ton)				
Heavy melt'g steel, P'gh.	\$20.00	\$20.00	\$20.00	\$15.75
Heavy melt'g steel, Phila.	18.75	18.75	18.75	15.00
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	16.50
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	11.75
Low phos. plate, Youngs'n	22.50	22.50	22.50	17.75
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke, Connellsville:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(per net ton at oven)				
Furnace coke, prompt	\$7.50	\$7.50	\$7.50	\$7.00
Foundry coke, prompt	9.00	9.00	9.00	8.25

Nonferrous Metals:	Oct. 30, 1945	Oct. 23, 1945	Sept. 25, 1945	Oct. 31, 1944
(cents per pound to large buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin, Straits, New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, virgin, del'd	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943 issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

Composite Prices . .

FINISHED STEEL	
Oct. 30, 1945	2.42471¢ per lb.
One week ago	2.42471¢ per lb.
One month ago	2.42471¢ per lb.
One year ago	2.21189¢ per lb.

PIG IRON	
Oct. 30, 1945	\$25.37 per gross ton
One week ago	\$25.36 per gross ton
One month ago	\$24.61 per gross ton
One year ago	\$23.61 per gross ton

SCRAP STEEL	
Oct. 30, 1945	\$19.17 per gross ton
One week ago	\$19.17 per gross ton
One month ago	\$19.17 per gross ton
One year ago	\$15.75 per gross ton

HIGH		LOW	
1945	2.42471¢ July	3	2.21189¢ Jan.
1944	2.30837¢ Sept.	5	2.21189¢ Oct.
1943	2.25513¢		2.25513¢
1942	2.26190¢		2.26190¢
1941	2.43078¢		2.43078¢
1940	2.30467¢ Jan.	2	2.24107¢ Apr.
1939	2.35367¢ Jan.	3	2.26689¢ May
1938	2.58414¢ Jan.	4	2.27207¢ Oct.
1937	2.58414¢ Mar.	9	2.32263¢ Jan.
1936	2.32263¢ Dec.	28	2.05200¢ Mar.
1935	2.07642¢ Oct.	1	2.06492¢ Jan.
1934	2.15367¢ Apr.	24	1.95757¢ Jan.
1933	1.95578¢ Oct.	3	1.75836¢ May
1932	1.89196¢ July	5	1.83901¢ Mar.
1931	1.99626¢ Jan.	13	1.86586¢ Dec.
1930	2.25488¢ Jan.	7	1.97319¢ Dec.
1929	2.31773¢ May	28	2.26498¢ Oct.

HIGH		LOW	
Oct. 30, 1945	\$25.37	Oct. 23	\$23.61
Oct. 23, 1945	\$23.61	Jan. 2	\$23.61
Jan. 2, 1945	\$23.61	Jan. 2	\$23.61
Jan. 2, 1944	\$23.61	Jan. 2	\$23.61
Jan. 2, 1943	\$23.61	Jan. 2	\$23.61
Jan. 2, 1942	\$23.61	Jan. 2	\$23.61
Jan. 2, 1941	\$23.61	Jan. 2	\$23.61
Jan. 2, 1940	\$23.61	Jan. 2	\$23.61
Jan. 2, 1939	\$23.61	Jan. 2	\$23.61
Jan. 2, 1938	\$23.61	Jan. 2	\$23.61
Jan. 2, 1937	\$23.61	Jan. 2	\$23.61
Jan. 2, 1936	\$23.61	Jan. 2	\$23.61
Jan. 2, 1935	\$23.61	Jan. 2	\$23.61
Jan. 2, 1934	\$23.61	Jan. 2	\$23.61
Jan. 2, 1933	\$23.61	Jan. 2	\$23.61
Jan. 2, 1932	\$23.61	Jan. 2	\$23.61
Jan. 2, 1931	\$23.61	Jan. 2	\$23.61
Jan. 2, 1930	\$23.61	Jan. 2	\$23.61
Jan. 2, 1929	\$23.61	Jan. 2	\$23.61

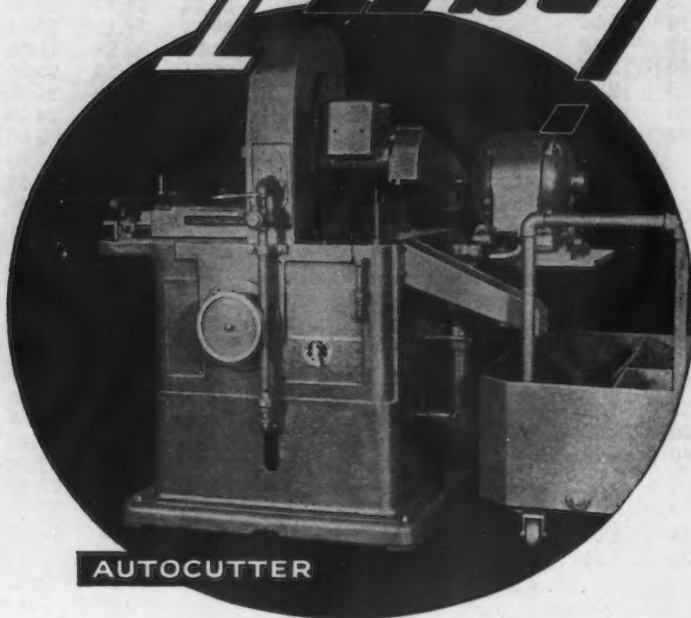
HIGH		LOW	
Oct. 30, 1945	\$19.17	Oct. 23	\$19.17
Oct. 23, 1945	\$19.17	Jan. 2	\$15.67
Jan. 2, 1945	\$19.17	Jan. 2	\$19.17
Jan. 2, 1944	\$19.17	Jan. 2	\$19.17
Jan. 2, 1943	\$19.17	Jan. 2	\$19.17
Jan. 2, 1942	\$19.17	Jan. 2	\$19.17
Jan. 2, 1941	\$19.17	Jan. 2	\$19.17
Jan. 2, 1940	\$19.17	Jan. 2	\$19.17
Jan. 2, 1939	\$19.17	Jan. 2	\$19.17
Jan. 2, 1938	\$19.17	Jan. 2	\$19.17
Jan. 2, 1937	\$19.17	Jan. 2	\$19.17
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Jan. 2, 1934	\$19.17	Jan. 2	\$19.17
Jan. 2, 1933	\$19.17	Jan. 2	\$19.17
Jan. 2, 1932	\$19.17	Jan. 2	\$19.17
Jan. 2, 1931	\$19.17	Jan. 2	\$19.17
Jan. 2, 1930	\$19.17	Jan. 2	\$19.17
Jan. 2, 1929	\$19.17	Jan. 2	\$19.17

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941 issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

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This "700" is "first" another way. It is the opening announcement of **CAMPBELL's** post-war program of development, based on wartime improvements all through the line. Other announcements will follow.

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WHY NOT DO THIS?

Write and tell us (1) the range of sizes, (2) kind of material, (3) length of cutoff pieces, (4) length of stock before cutting, (5) tolerance for length of cut pieces and (6) hourly production requirement. With this information, **CAMPBELL** engineers can recommend production procedure and work up cost sheets for you.

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NEWS OF INDUSTRY

American Welding Society Elections At Annual Meeting

New York

• • • Dr. Wendell F. Hess, professor of metallurgical engineering and head of the welding laboratory, Rensselaer

Polytechnic Institute, Troy, N. Y., has been elected president of the American Welding Society for the year 1945-46. Harold O. Hill, assistant chief engineer, fabricated steel construction, Bethlehem Steel Co., Bethlehem, Pa.,



Dr. W. E. Hess

has been elected first vice-president of the society, and George N. Sieger, president and general manager of the S-M-S Corp. of Detroit, Mich., has been elected second vice-president.

The following were elected directors at large for the society for a term of three years: R. D. Thomas, president, Arcos Corp., Philadelphia, Pa.; Charles H. Jennings, section engineer, welding section, Westinghouse Research Laboratories, East Pittsburgh, Pa.; A. B. Kinzel, vice-president of the Electro Metallurgical Co. and of Union Carbide & Carbon Research Laboratories, Inc., and C. M. Underwood, manager, weldment dept., Northern Ordnance, Inc., Minneapolis.

At the society's annual meeting held in the Hotel Pennsylvania, David S. Jacobus and H. C. Boardman were presented with a certificate of honorary membership and honorary membership was also conferred on H. H. Deppeler who was also the recipient of the Samuel Wylie Miller Memorial Medal for the year 1944.

Leon C. Bibber, welding engineer for Carnegie-Illinois Steel Corp., received this year's award of the Lincoln Gold Medal and Certificate at the annual meeting. Also four prizes sponsored by the Resistance Welding Manufacturers Assn. were awarded to L. A. McIntosh, McIntosh Stamping Corp., Detroit; W. F. Hess, R. A. Wyant, of



Leon C. Bibber

[CONTINUED ON PAGE 122]

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[CONTINUED FROM PAGE 118]

Rensselaer Polytechnic Institute, and B. L. Averbach, works laboratory, General Electric Co., Schenectady, N. Y.; G. W. Scott, L. G. Sutton and J. H. Widemyer, all of the research laboratory of Armstrong Cork Co., Lancaster, Pa., and J. C. Barrett, research metallurgist, Glenn L. Martin Co., Baltimore.

Russians Rehabilitate Destroyed Steel Works In Ukrainian S.S.R.

New York

• • • A blast furnace with a volume of 1300 cu m has been restored and is again turning out pig iron in the southern part of the Ukrainian S.S.R., according to I. Andronov, writing in *Iron and Steel*, British magazine. It is one of the four Nazi-wrecked blast furnaces in the Azovstal iron and steel works in Mariupol, on the coast of the Azov Sea.

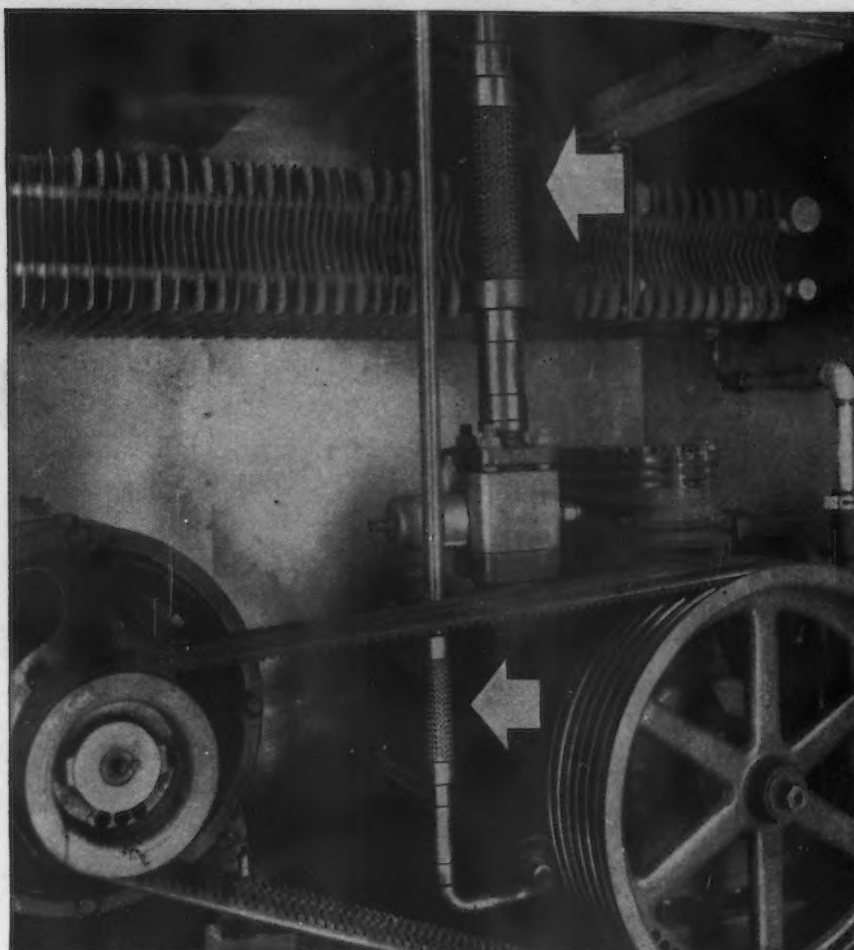
Prior to the German invasion the Azovstal works was one of the most up-to-date iron and steel plants in the Soviet Union. In 1930 it produced 1½ times more steel than in the preceding five years. The output of pig iron and steel doubled a few years later, and tripled on the eve of war.

The settlement built for Azovstal workers had more than 12,000 modern houses with fine gardens and orchards, new schools, nine clubs, four cinemas, seven libraries, a large hospital, a polyclinic and lying-in hospital, as well as a rest-home situated in the park skirting the seashore.

German troops broke into Mariupol in October, 1941, and German engineers appeared at the Azovstal works soon afterwards. For 22 months they ransacked the town and the workers' settlement, and shipped equipment to Germany. On the eve of their retreat the occupationists blew up the workers' houses and the blast furnaces. The explosions shook the town like an earthquake. Chunks of blasted metal weighing up to eight tons were later found half a mile away from the scene of the explosions. Mountains of twisted metal and rubble rose on the sites where the shops once stood.

Restoration was started immediately after the liberation of Mariupol. The first thing to be done was to clear away the debris.

Metallurgists restored a small cupola to provide themselves with iron castings. Then several machine tools were put together from parts sal-



REX *Vibra-Sorbers* Reduce Vibration Hazards

REX VIBRA-SORBERS—properly installed—substantially reduce servicing costs. For **REX VIBRA-SORBERS** have the exceptional strength and flexibility needed to absorb prolonged vibration and thus prevent the transmission of noises throughout the entire piping system.

In addition, **REX VIBRA-SORBERS** are pressure-tested to insure "refrigerant-tightness." This means greater protection against

leakage of valuable refrigerants. **REX VIBRA-SORBERS** of copper bearing alloy are normally used for Freon and Menthol. Units of steel alloys are available for ammonia. Thus, effective corrosion resistance is assured in all types of installations.

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MAYWOOD, ILLINOIS

Plants: Maywood and Elgin, Ill.





How MUREX FHP licked a tough job for us

Friends, did you ever know it to fail? I mean, just when your department gets running along smoothly, in marches a rush-rush job that they want done practically yesterday.

Take what happened to us last week: forty big engine bases that had to be fabricated right away, if not sooner—and each of them requiring 3860 lineal inches of welding. Tommy, our boss, took one look at the due-date on the job, and groaned.

"Okay," he said at last, trying to look cheerful. "Can do, I hope."

But after two units, we saw we'd never make it. They took 12 hours of welding time each, whereas we needed to make 10 hours or less to finish on schedule.

Whereupon I stepped up to Tommy, observing, "Look, I'm only a girl welder, and new around here anyway. But why are we using ordinary *all-purpose* electrodes on this job, when MUREX FHP would knock it off in very much less time? The last place I worked specialized in the fabrication of heavy bases and machine frames. We always used MUREX FHP on this sort of thing. Why don't we position these frames and . . ."

Tommy looked at me oddly. "Say no more, sister," he said. "Say no more. I should have seen right off the bat that this is a natural for downhand welding and good old MUREX FHP. But we were in such a rush, and I wanted to use up our stock of E6010

rods, and . . ."

The next day, a load of MUREX FHP came in. The first assembly was finished in *eight* hours as against the twelve the other rods took—a *saving of over thirty per cent!*

And, the MUREX man did us another good turn, by giving us a big new Wall Chart, which lists and classifies all of M&T's 30-odd electrodes. Now, when a new job comes in, Tommy consults the chart carefully to see which MUREX rod is the one to use...and he says we've saved lots of headaches that way.

If you have anything to do with arc-welding, you'd better send for the new Wall Chart for yourself. Just address:

METAL & THERMIT CORPORATION

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MUREX
Electrodes



Saves the cost of an extra operation . . .

by supplementing automatic machine
with a standard, low-cost Delta component

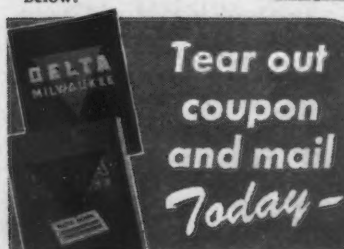
The success of other plants warrants
your consideration of these money-
saving production ideas:

1. Save the extra cost of special machines, by using standard, low-cost Delta components to build high-production, specific-purpose machines — quickly convertible to other uses when requirements change.
2. Save the extra cost of new machines, by modernizing your present units that are approaching obsolescence — replacing worn elements with regular, stock-model Delta components.
3. Utilize the portability and compactness of Delta-Milwaukee Machine Tools, to revise or supplement production-line layouts for more efficient operation.

MA-26

Delta's 76-page Blue Book provides 140 case histories of valuable war production experience that suggests similar peacetime applications in your plant. Also available is a catalog of low-cost Delta-Milwaukee Machine Tools. Request both, using coupon below.

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MILWAUKEE
Machine Tools



THE DELTA MANUFACTURING CO.
704M E. Vienna Ave., Milwaukee 1, Wisconsin

Please send my free copies of Delta's 76-page
Blue Book and catalog of low-cost machine tools.

Name _____
Position _____
Company _____
Address _____
City _____ State _____

Taking advantage of the light weight and compactness of Delta-Milwaukee Machine Tools, J. I. Case, Racine, Wis., developed the special setup illustrated — to enable an automatic drill press operator to perform an additional step at no extra labor cost.

A 14" Delta drill press head has been mounted horizontally to the table of a drill press equipped with a multiple-drill head. The operator starts the automatic feed of the multiple-drill head — then drills a hole in the periphery of a flywheel with the Delta machine.

An economical short-cut such as this speeds production, provides ease of operation, and reduces costs. It is typical of the ways in which hundreds of plants have employed Delta's modern, flexible approach to tooling.

Delta's savings in cost, weight, and space are not obtained at the expense of quality. They result from advanced design and from quantity production of standard models.

Perhaps the versatility of Delta-Milwaukee Tools may help solve your production problems. Investigate!

vaged from the wreckage. The parts of the blasted equipment which could be repaired were used in rebuilding the cranes, open-hearth furnaces and power units.

A complete cycle of metallurgical production was gradually restored. Eight open-hearth furnaces have been working at the Azovstal plant in the past year, as well as a foundry for manufacturing special castings, two cast iron foundries, several sheet and armour rolling mills, and a tube welding department, the last-named being the largest of its kind in the Soviet Union. Large tubes for the oil industry are welded here. Also restored and working today at the Azovstal works are a forge shop, a firebrick plant, and a skull-cracker. Good progress has been made in the rehabilitation of power facilities.

Blast furnace No. 3 was comparatively easier to restore, and while this work went on the coke battery was rehabilitated to supply the blast furnace with coke. The Mariupol metallurgists displayed their initiative and ingenuity in utilizing all the materials they could find among the ruins of their enterprises. Blast furnace No. 3 and the coke battery resumed production.

Engineering history was made in the rehabilitation of blast furnace No. 4, where new problems had to be solved. This blast furnace, which will soon be ready for operation, settled 3½ m and tilted to an angle of 30° as a result of the damage done to its foundation by nearly one ton of high explosive planted there by Nazi engineers. Instead of dismantling the furnace and building a new one, the restoration engineers suggested saving time and materials by raising the gigantic structure into a normal position by hydraulic jacks. The blast furnace had a volume of 1300 cu m, was 70 m high, and weighed nearly 1500 tons. To raise it first half a meter, and then move it more than a meter back to its old place, turn it several degrees on its axis, and finally raise it 3½ m and hold it in the air while eight new supports were put up, the tuyère section on the hearth replaced completely and the twisted gas mains straightened, was indeed a bold scheme. But the Mariupol engineers and workers took this risk in order to speed up the plant's rehabilitation. It took 3200 man-days to complete the complicated job, instead of 16,000 man-days which would have been required if the blast furnace had been dismantled and built anew.

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Service*

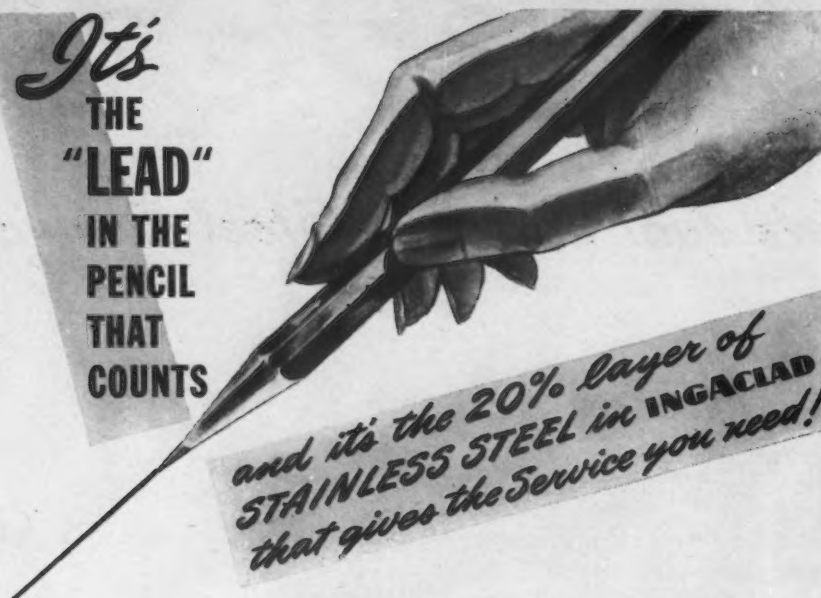
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"LEAD"
IN THE
PENCIL
THAT
COUNTS



For many jobs it is just as impractical to use solid stainless as it would be to insist on an "all-lead" pencil. The "backing" element in both cases gives you a more practical . . . more economical product for most uses.

If you are planning on modernizing your plant equipment or products by using stainless steel, investigate IngAclad Stainless-Clad.

As producers of both Ingersoll Solid Stainless and IngAclad, our engineers will advise you without prejudice and without charge.

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Solvay Process Co.
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NEWS OF INDUSTRY

Alcoa Introduces New Aluminum Roofing Sheet

Pittsburgh

• • • Alcoa roofing sheet, a new aluminum product is virtually ready for the market, it was announced this week by Aluminum Co. of America. The sheet will be produced by Alcoa in corrugated and other conventional forms of roofing and as flat roofing sheet. It will be available for farms as well as urban dwellings, and will be stocked by Alcoa in 6, 8, 10, and 12 ft lengths.

Alcoa roofing sheet will be stocked by hardware dealers, lumber yards, farm cooperative stores and other distributors of roofing throughout the country. These agencies will also stock necessary aluminum roofing accessories.

Advantages of aluminum roofing include its longer life, its non-staining characteristics, and the fact that it requires no painting. Moreover, aluminum roofing is lighter in weight and easier to handle and install.

Proof of the durability of aluminum for outdoor use is seen in the service record of buildings utilizing this metal in various forms as a roofing material. Aluminum roofs on buildings in Italy and Switzerland have survived more than 40 years of weathering, while many buildings in this country have aluminum roofs more than 20 years old. The armed services used about 44,000,000 lb of aluminum sheets in the construction of barracks, shelters, and other buildings in all war theaters.

Engineers Plan New Lab

Cleveland

• • • Nearly \$100,000 will be spent on the expansion and operation of the American Society of Heating and Ventilating Engineers' research laboratory here, within the next 12 months, officers of the Society announced.

Approximately \$20,000 of the amount allotted by the society will be spent for improvements and expansion of the laboratory, which was hailed by Dr. C. E. A. Winslow of New Haven, Conn., as the "outstanding research laboratory of its kind in the country."

Principal research project of the laboratory, moved here from Pittsburgh a little more than a year ago, centers around the removal of dust and fumes from factories.



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Get free test kit.
Contains a variety
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types and sizes.
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These are the things your handling system should have for efficient production. Lifting loads, carrying them *anywhere* in the plant or yards, placing them exactly where you want them—that's what Mobilcranes and Supercranes can do for you—and they do it economically too . . . thanks to one man operation, one engine power and pneumatic tires.

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MOUNTED ON RUBBER TIRES

**Fast • Safe • Maneuverable
Economical to Operate**

ONE-MAN CONTROLLED • ONE-ENGINE OPERATED • RUBBER-TIRED

THE **OSGOOD** CO.

MOBILCRANES

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SUPERCANES

MARION, OHIO

NEWS OF INDUSTRY

Magazine Features New Type Container

Pittsburgh

• • • In the October issue of U. S. Steel News, employee publication of U.S. Steel Corp. subsidiaries, is featured a story entitled "Boxes From Heaven" which relates the contribution made by the corporation through one of its subsidiaries, the Gerrard Steel Strapping Co., in helping the Army develop the so-called free-fall cargo containers.

The box is made of wood, but it is steel strapping that makes it impact proof. The steel has sufficient elasticity to absorb the shock of the fall without breaking. When dropped from great heights, the box does not break open or explode, though it sometimes rebounds from the ground as much as 30 ft and rolls over repeatedly before coming to rest.

The box, equipped with a wire cutter which enables it to be opened in 22 sec, has been used by the Army to deliver such varied items as water, gasoline, ammunition, food, medicine, surgical instruments and dressings, clothing and rifle parts.

In peacetime the container will be useful in delivering supplies to communities not equipped with air port facilities. In effect, it will place all towns on an air express line. In time of floods or forest fires, it will prove invaluable in sending supplies to isolated communities.

Car Builders See Exhibit

Pittsburgh

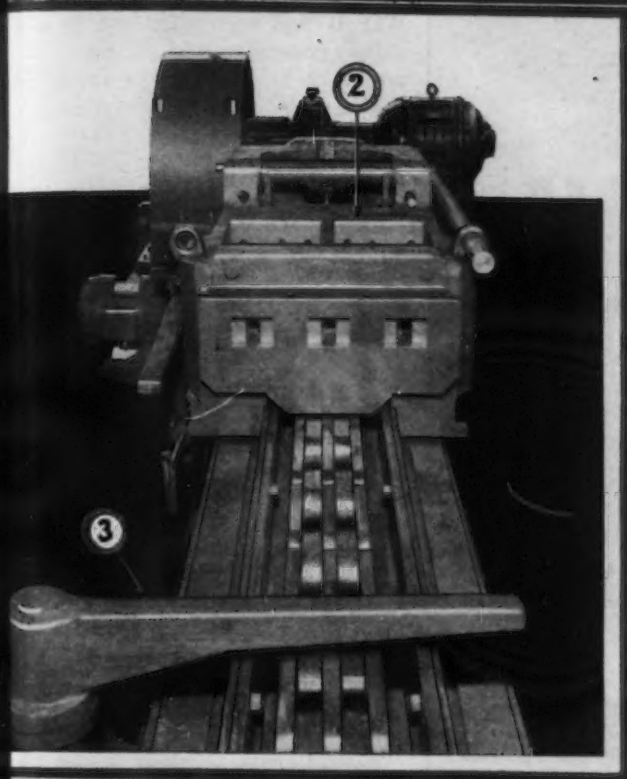
• • • In connection with the 10th anniversary of the first commercial production of USS Cor-ten, a low-alloy high-strength steel, committees of the Association of American Railroad and the American Railway Car Institute attended an exhibit of freight cars made of this material held at the Homestead Works of Carnegie-Illinois Steel Corp. recently.

The two committees which made the inspection trip to this U. S. Steel subsidiary plant were the Committee on Car Construction of the Mechanical Division, Association of American Railroads and the Design Committee of the American Railway Car Institute, in Pittsburgh.

The inspection party examined 14 various types of railroad cars that have been in service for the greater part of the 10 years that Cor-ten has been in production.

McKAY

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1. Hydraulic push pointer. (Insures lower maintenance cost)
2. Automatic wedge type grip-buggy for single and multiple draw with quick change feature.
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4. Hi-speed automatic grip-return with slow pull-in feature.
5. Steel construction throughout.
6. Constant or variable speed drive.



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YOUNGSTOWN, OHIO

Also build: TUBE DRAWBENCHES, BAR SHEARS and ROTARY POINTERS

these 3 units

MADE INDUSTRY SPEED CONTROL MINDED

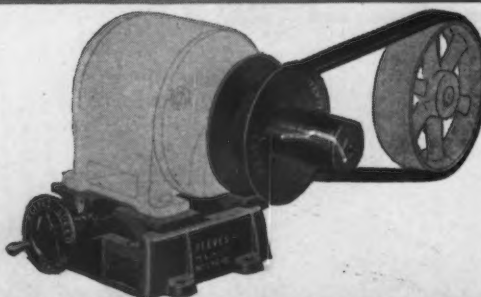
REEVES VARIABLE SPEED TRANSMISSION

Provides infinite speed adjustability over wide range. Accurate at all speeds. Modern, compact open and enclosed designs, vertical and horizontal. Fifteen sizes—fractional to 87 h.p. Speed variations from 2:1 to 16:1 inclusive.



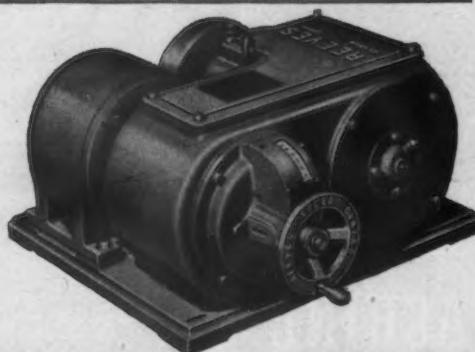
REEVES VARI-SPEED MOTOR PULLEY

Simplified development of transmission. Mounts on standard shaft of any constant speed motor. Forms actual drive to machine. Sliding motor base is moved forward or back for speed changes. Ten sizes—fractional to 15 h.p.; within 4:1 range of variation.



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Combines in one compact, self-contained enclosure, constant speed motor, REEVES speed varying mechanism and reduction gears (where required). Available in space-saving, horizontal and vertical types— $\frac{1}{4}$ to 15 h.p. Speed variations 2:1 to 6:1 inclusive.



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REEVES PULLEY CO., COLUMBUS, INDIANA

REEVES Speed Control

NEWS OF INDUSTRY

Re-employment of Vets Reaching 13,000 Total At U. S. Steel Plants

Pittsburgh

• • • Nearly 13,000 veterans of World War II had been employed by subsidiary companies of U. S. Steel Corp. until Aug. 31, the company announced, adding that the veteran re-employment figure is increasing daily.

Of the number employed 8907 were former employees, and 3963 were veterans not previously employed by the companies. More than 110,000 employees of U. S. Steel Corp. subsidiaries left their jobs during the war to enter the armed services.

Many of the veterans who have been given postwar jobs have returned with physical handicaps which rendered them incapable of performing their former work, officials said. Subsidiary companies of U. S. Steel made a comprehensive job survey in their plants, thereby determining whether a job could be performed by a handicapped veteran. In this manner many returning servicemen were fitted into new jobs which they were capable of handling despite handicaps resulting from war injuries.

Carnegie-Illinois Steel Corp. sent to its 44,000 employees in the armed services a questionnaire for the purpose of determining their plans for returning to their former jobs, and what new skills they may have learned as a result of Army training. Of 7000 Carnegie-Illinois employees in service who have replied to this questionnaire, 6160, or 88 pct, have indicated that they plan to return to their former jobs, 9.6 pct are undecided and 103 plan to enter college under the G. I. Bill of Rights.

Shipyard to Be Sold

Montreal

• • • United Shipyards Ltd., the largest shipbuilding plant in Canada to close since the end of the war, went on the block to be sold, with the turning over of all its building and equipment to the War Assets Corp. Oct. 17.

The shipyard which was government owned, and operated at Montreal by Fraser-Brace Co. during the four years of its existence, turned out 46 ocean going ships of 10,000 tons and two invasion craft for the Royal Navy, the largest naval craft ever built in Canada. The yard completed its final launching Oct. 12.

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Angier
OF FRAMINGHAM

50th
Anniversary
1895 - 1945



A HALF CENTURY OF PROTECTION

*. . . to the Products of Our Nation
and its Industries in Peace and War*

Airplane engine and parts manufacturers were up against it for a grease-proof wrapper to prevent corrosion. Angier of Framingham produced it in INDUWRAP, which more than meets any specification ever drawn for a Grade A, Type I wrapper.

Chrysler of Canada engines were in trouble because of damage from the elements while enroute overseas. Angier helped to eliminate this trouble with A-19 BROWNSKIN GRIZZLYBEAR.

The government and many war industries needed for tarpaulins, case-liners and wrappers an extra-tough, non-deteriorating, water-resisting paper to protect countless products of war. Angier met the need with BROWNSKIN.

And Angier GRIZZLYBEAR, in both the asphalt and resinous grades, has been a constant solver of problems confronting shippers of airplane motors and critical wire, much of the latter in spirally-wrapped coils.

Have you an essential problem in product protection? Put it up to Angier engineers.

ASK FOR LITERATURE AND SAMPLES

Please mention by name this magazine

ANGIER CORPORATION
CORROSION PREVENTIVE AND WATERPROOF PAPERS
FRAMINGHAM, MASSACHUSETTS





SEMISILICA BRICKS

DURATION OF HEAT AFFECTS REFRACTORIES

Following statements are based on temperature range from 2200° F to 2700° F.

SHORT DURATIONS OF HEAT

Furnaces with daily or shorter firing cycles usually require a good clay or super duty brick.

MODERATE DURATIONS OF HEAT

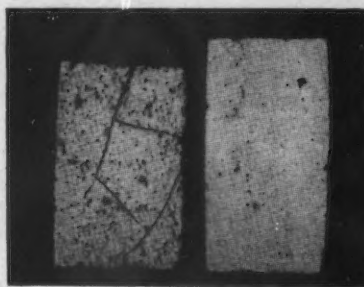
Furnaces with firing cycles of days, weeks or months require refractories which will not vitrify, shrink or spall, from the prolonged heats.

RM SEMISILICA BRICKS are made for this service. The picture at the right shows the results of 24 hours at 2650° F. on a First Quality Clay Brick and the almost unaffected RM.

LONG DURATIONS OF HEAT

Furnaces, intended to be run continuously can safely be lined with **RM SEMISILICA BRICKS**, provided the face temperature of the lining is below 2700° F. While silica bricks are ideal for continuous heats, a furnace may have to be shut down, which is hard on Silica Bricks, but **RM SEMISILICA BRICKS** take it easily.

Note. Some slags and gases attack refractories, so if in doubt, please ask or write for recommendation for your furnaces.



Compression, vitrification and spalling of First Quality Clay Brick, and relatively unaffected RM Semisilica brick after a run of 24 hours under heat and load.

In STEEL MILLS:

For Heating, Reheating, Annealing and Heat Treating Furnaces, OH Regenerators, Blast Furnace Stoves, Soaking Pits, etc. In the roofs, where spalling failure is most prevalent, they perform their greatest service.

In MANY INDUSTRIES:

Such as Chemical, Ceramic, Zinc Smelting and other industries where continuous heats in the temperature range of RM's are required for their processes.

RICHARD C. REMMEY SON CO.
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REMMEY

Ayres Recommends U. S. Limit Wage Grants To Necessities of Life

Cleveland

••• "If all workers in the automobile industry are given a 30 pct, or even a 15 pct increase in hourly pay, new car prices will have to be advanced by about the same proportions," Brig. Gen. Leonard P. Ayres, well known economist and a vice-president of the Cleveland Trust Co., declared in his monthly business bulletin.

In citing the automobile industry as an example, General Ayres pointed out that unless production costs can be controlled, wholesale and retail prices cannot be regulated successfully for very long.

"As matters now stand," he said, "a good many raises are inevitable because the administration regards them favorably. "The best way to diminish their influence as factors making for higher prices would be to limit controls to articles or materials which are genuine necessities of life and which are in such short supply that they must continue to be rationed for a while. As for all the rest, the best price regulator would be free price competition."

Other statements from Gen. Ayres' business bulletin follow:

"Industrial production declined more in August than it had in any other single month since 1937. This reduction reflects the ending of the wars, even though the surrender of Japan did not occur until the middle of the month. Production has been declining irregularly for two years, but not until recent months has it been decreasing sharply.

"August figures show a volume 8 pct smaller than the output of July, and are lower than for any month since Nov., 1940. Details so far available indicate that reductions have mainly occurred in the durable goods industries and those producing war materials.

"In Washington the Full Employment Bill is being debated. The bill provides that early in each calendar year the President shall cause estimates to be made of the probable volumes of employment and unemployment which may be expected to exist during the next fiscal year. If these estimates indicate that considerable unemployment is to be expected, the governmental authorities are to take appropriate steps to create a sufficient number of job opportunities to

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PROGRESSIVE **PRESS WELDERS**

PROGRESSIVE field engineers, backed by a greatly expanded staff of design and application engineers selected from the resistance welding industry for their breadth of experience and "results", will be glad to help you simplify and speed up your assembly and welding operations.

PROGRESSIVE projection-welding is one of the simplest methods there is to attach one part to another—brackets to larger pieces, forgings to stampings, etc., etc.

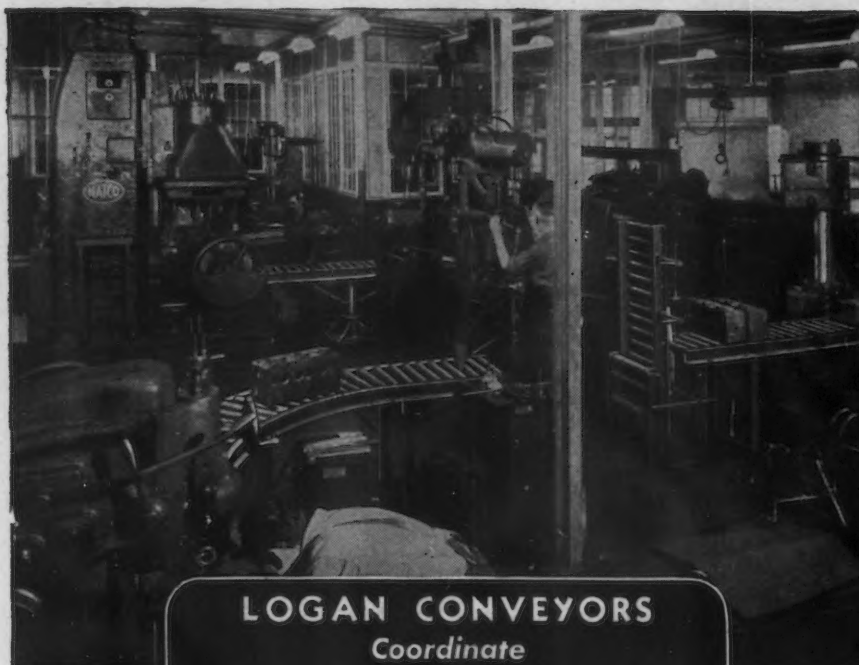
Welding dies are simple, hold studs to close tolerances for position. Just drop the parts in place, press a button, and the parts are attached FOR LIFE.

In the example illustrated above, use of standard PROGRESSIVE Press Welders and PROGRESSIVE-ENGINEERED set-up, a number of customary operations are eliminated and yet a BETTER PRODUCT is turned out.

The exact equipment needed for an operation like this depends of course on production quantity. The particular installation shown is being used for high production.



Welder Co. 3050 E. OUTER DRIVE • DETROIT 12
RESISTANCE WELDING EQUIPMENT



LOGAN CONVEYORS

Coordinate

MACHINE TOOL OPERATIONS

in this motor plant



HERE is an outstanding illustration of correct conveyor engineering to link up several intricate cylinder head boring operations. Note pedestal type turntable directly in front of NATCO machine in upper picture — also hinged gate section in foreground. In lower view cylinder head castings are transferred from roller conveyor onto hydraulic elevating turntable and then to multiple drill at far left.

A Logan catalog including illustrations covering a wide variety of Logan conveyor installations is available without obligation. Write for it.
Logan Co., Inc., 545 Cabel Street, Louisville 6, Kentucky

Logan Conveyors

PUT FLOW INTO PRODUCTION

give employment to those who would otherwise be out of work.

"If the bill should be enacted into law, there would have to be carried through each year an extensive program of forecasting, and it would be of the utmost importance that the forecast should be closely accurate.

"From 1923 through 1945 there were only three years out of the 23 in which the expenditures proved to be less than had been estimated. The average error for the 23 years is 32 pct but that number is distorted by the fact that in the fiscal year 1933 the expenditures were 273 pct greater than those included in the forecasts. If that year is omitted, the average error for the other years is 21 pct. Clearly, the government experts have not yet learned how to make even fairly accurate forecasts of federal expenditures."

Forms New Z-Metal Research Institute

Newark, N. J.

• • • Announcement has been made of the formation of the Z-Metals Research Institute, an organization whose purpose is to sponsor research and development of the pearlitic malleable iron commercially known as Z-Metal.

A contract has been entered into with Battelle Memorial Institute, Columbus, Ohio, whereby Battelle will continue on an enlarged scale, the research work which it has been conducting for the past few years under the sponsorship of the licensor.

The board of directors are: Duncan P. Forbes, president, Gunito Foundries Corp., Rockford, Ill.; P. E. Landolt, president, Z-Metals, Inc., New York; Brinton Welser, vice-president, Chain Belt Co., Milwaukee; A. F. Crone, vice-president, Acme Steel & Malleable Iron Works, Buffalo; J. L. Linsley, director of research sales, Eastern Malleable Iron Co., Naugatuck, Conn.; A. C. Moore, president, Chicago Railway Equipment Co., Chicago; P. H. Vincent, general manager, Erie Malleable Iron Co., Erie, Pa.

The officers are: President, Duncan P. Forbes; vice-president and secretary, Glynn Morris; treasurer, Lester A. Crone.

Mr. Glynn Morris who is general manager was formerly secretary and treasurer of the Alloy Casting Research Institute. Mr. C. R. Wiggins formerly of Republic Steel Corp. is staff metallurgist.

The Institute's office is located at 1060 Broad Street, Newark 2, N. J.

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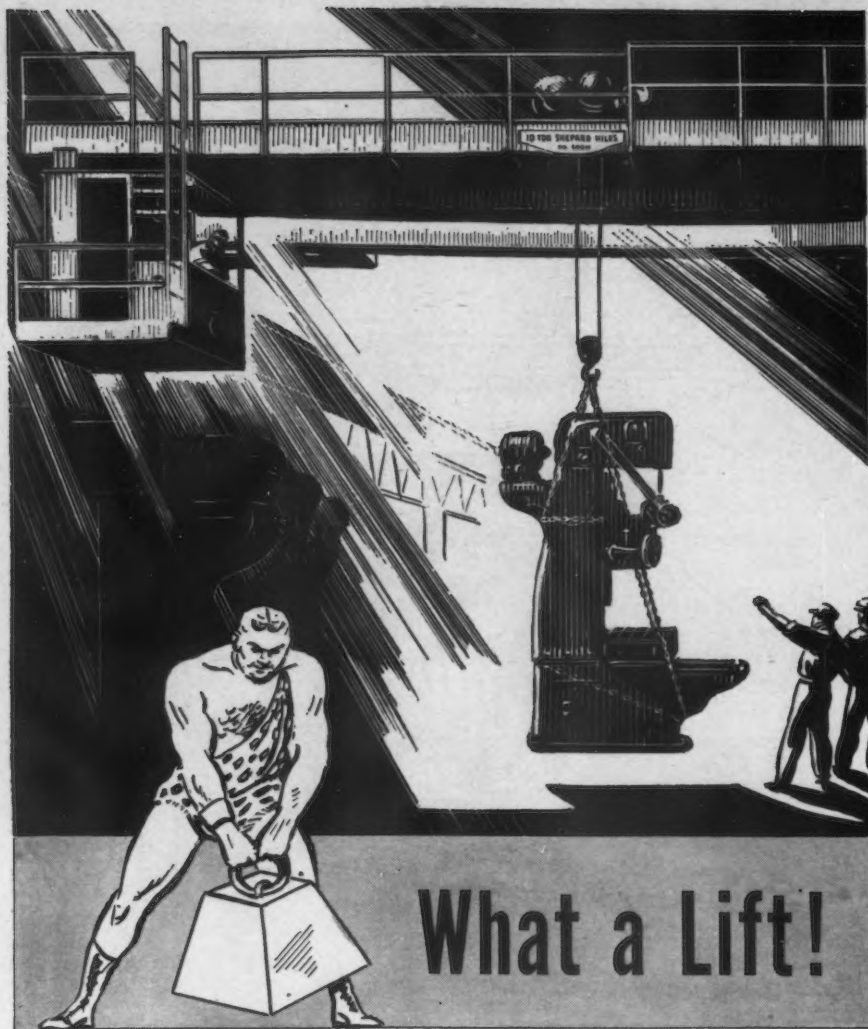
A brakeman on a freight car . . .
An operator on a crane deck . . .
A pedestrian on a sidewalk cover . . .
An oiler in an engine room . . .

Every time he puts his foot down, forty Diamond Treads are there — reaching up to give him extra traction; to hold against slipping in any direction.

That is why Management and Engineers in Industry, Transportation and Marine Service specify "A.W." Super-Diamond Floor Plate wherever a need for permanent protection is indicated. Toughest traffic will not damage it. Easy to clean, quick to drain. Overnight installation assures no interruption to production. Write for catalog.

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Data on Specification For Design of Light Gage Steel Discussed

New York

• • • Research which the Committee on Building Codes of American Iron & Steel Institute has been sponsoring since 1939 at Cornell University has provided sufficient data for presentation soon to the engineering profession in a specification for the design of light gage steel structural members. When available, the specification will provide a sound and rational basis upon which to design with light gage sheet and strip steel.

The testing program, involving over 700 structural specimens ranging in thickness from 0.1532 in. to 0.245 in. and flange widths from 1 in. to 16 in., has provided many basic data. The results of the test work were paralleled and supplemented by extensive investigations of the theory of the strength and behavior of light gage structural members.

The specification being developed from the data will include provisions which distinguish between the behavior of stiffened and unstiffened flanges and their relative load carrying capacities.

Among other provisions in the specification will be:

1. In addition to the basis bending stress of 18,000 lb per sq in. for structural grade carbon steel, the use of higher strength steels at correspondingly increased unit stresses is permitted for those recognized grades whose minimum properties are guaranteed by the manufacturer.
2. Two sets of allowable column stresses are given, based on considerations of end restraint, and giving recognition to deviations from straightness of the member, and to unavoidable eccentricity due to loading.
3. Stresses for beams with laterally unbraced compression flanges are given in terms of the ratio of length to radius of gyration, rather than flange width. Recognition is accorded to the fact that many structural members are provided with lips, and that a flange with lips is inherently stiffer in resisting lateral distortion than a flange without such lips.
4. Maximum flat width ratios (ratio of width to thickness), as related to different unit design stresses,

FOR EVERY JOB THE RIGHT SHEET

Nothing lends a hand to help you turn out good work like the *right* galvanized sheet. The *right* sheet has good workability. That's why Continental sheets are uniformly tempered for good forming qualities... why they have an unusual ability to withstand forming operations without flaking or peeling of the coating.

But Continental sheets are *right* in more than workability. They are *right* to help you put extra value into every job. CHECKERCOAT sheets add distinctive appearance. COPPERIOR sheets are made of highly rust resistant copper steel to assure long life. SUPERIOR GALVANIZED sheets are special quality—an aid to good workmanship. Ask your jobber about these well-known sheets produced by Continental Steel Corporation and The Superior Sheet Steel Company.



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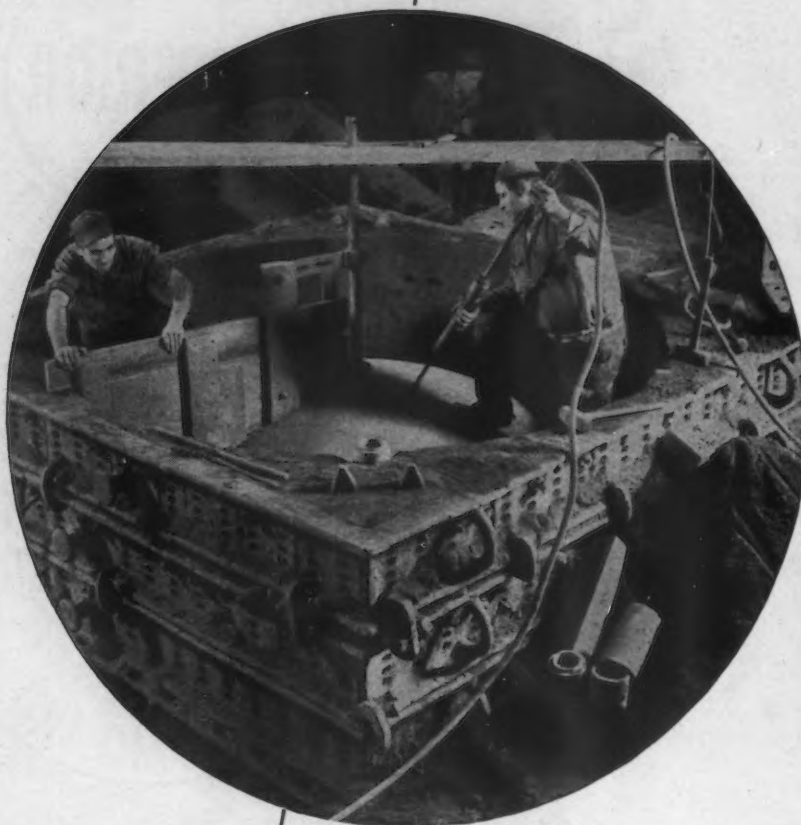
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YOU CAN PUT IT ALL UP TO STRONG, if you have a steel casting from 30 pounds to 30,000 pounds—or a size range of almost any conceivable shape or proportion. The sweep method shown above—typical of Strong's versatility—saves the customer the costly pattern making otherwise needed for this unusually shaped, 33,000 pound casting. Strong molding facilities range from small snap flasks to steel flasks 16 feet square. This size range is governed only by the size of Strong's largest annealing oven (15 x 19 feet). Be sure you know the modern art of steel casting, as Strong has developed it!

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STRONG IN FACT

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N.Y.



TENSILE STRENGTH ELONGATION

NEWS OF INDUSTRY

are specified for various types of compression elements.

5. Cognizance is taken of the bracing effect of collateral wall sheathing material on the strength of steel stud sections, and provisions are included for evaluating the lateral restraint required from, and supplied by, these wall materials and their attachments.

Says Wartime Advances In Technique Provide For Magnesium Future

Chicago

• • • Wartime advances in manufacturing techniques and quality of product, coupled with ready availability, provide a bright postwar future for magnesium, recent addresses before various Midwestern groups by Dan W. Moll, vice president and treasurer of Hills McCanna Co., and William R. Caple, Dow Chemical Co., indicate.



Dan W. Moll

Lowered cost, both of the virgin metal and fabricated products, will

allow many new uses on the basis of availability, weight, strength properties and fabrication characteristics, the speakers declared.

Mr. Moll, chairman of the castings division, The Magnesium Assn., called attention to reduction in weight of the four wheels on trucks and busses from 800 to 200 lb in foreign application. A truck body constructed of magnesium alloys made a reduction in weight making it possible to carry 500 more pounds of payload at an extra cost of \$800.00 over and above the cost of a steel-bodied truck. Portable tools can be reduced in weight from 25 pct to 40 pct and the weight of a wheelbarrow from 125 lb to 35 lb, he pointed out.

Both speakers minimized the danger of fire in the machining of magnesium, provided that chips are not allowed to accumulate on floors or machines, that wet-type dust collectors are used when grinding, and that the metal either is machined dry or with a water-free mineral oil type cutting fluid. Mr. Moll said that tests in his company's shop showed that magnesium can be machined approximately 25 pct faster than aluminum,



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...this specialty steel
(a high-carbon grade)
toughened by Nickel

Built for tough jobs, this bandsaw is .80 carbon steel fortified with 2.25 to 2.50% Nickel.

The maker ... E. C. Atkins and Company of Indianapolis, Indiana ... specifies Nickel to secure the reliable performance assured by the special mechanical properties developed by high-carbon Nickel alloy steel.

In addition to imparting ability to withstand repeated flexure, Nickel improves wear resistance, handling characteristics in fabrication and response to heat treatment.

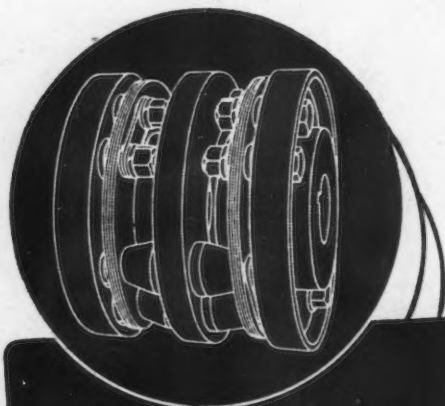
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.... are specified by engineers, wherever
100% Operating Efficiency is demanded



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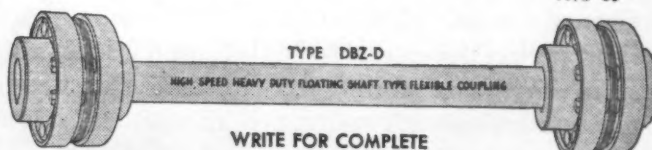
flexible COUPLINGS

provide for
Angular and Parallel
Misalignment as well
as Free End Float...

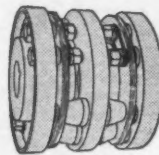
and Eliminate
**BACKLASH, FRICTION,
WEAR and CROSS-PULL**

NO LUBRICATION IS REQUIRED!

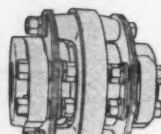
The Thomas All-Metal Coupling
does not depend on springs, gears,
rubber or grids to drive. All power
is transmitted by direct pull.



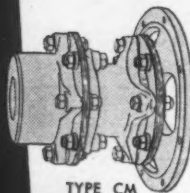
WRITE FOR COMPLETE
ENGINEERING CATALOG



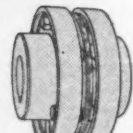
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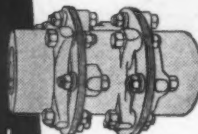
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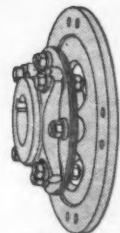
TYPE CM



TYPE ST



TYPE AM



TYPE SS

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

NEWS OF INDUSTRY

35 pct faster than bronze, and 50 pct faster than iron or steel.

In outlining ease of fabrication, Mr. Caple contended that most joining methods in common use for other metals are suitable for magnesium with certain minor changes in technique. Forming of magnesium sheet is usually done at elevated temperatures, but no heat treatment is required after forming to obtain maximum strength. Deeper hot draws can be made in a single operation on magnesium than can be made cold in any other metals, he asserted.

Corrosion resistance of magnesium has improved greatly, Mr. Caple said, since the elimination of flux inclusions causing potential corrosion areas and the avoidance of inclusions of other metals in high purity magnesium alloys. At a sea water exposure station operated by Dow Chemical Co., magnesium has shown far better comparative corrosion resistance than in accelerated salt water laboratory tests formerly given credence.

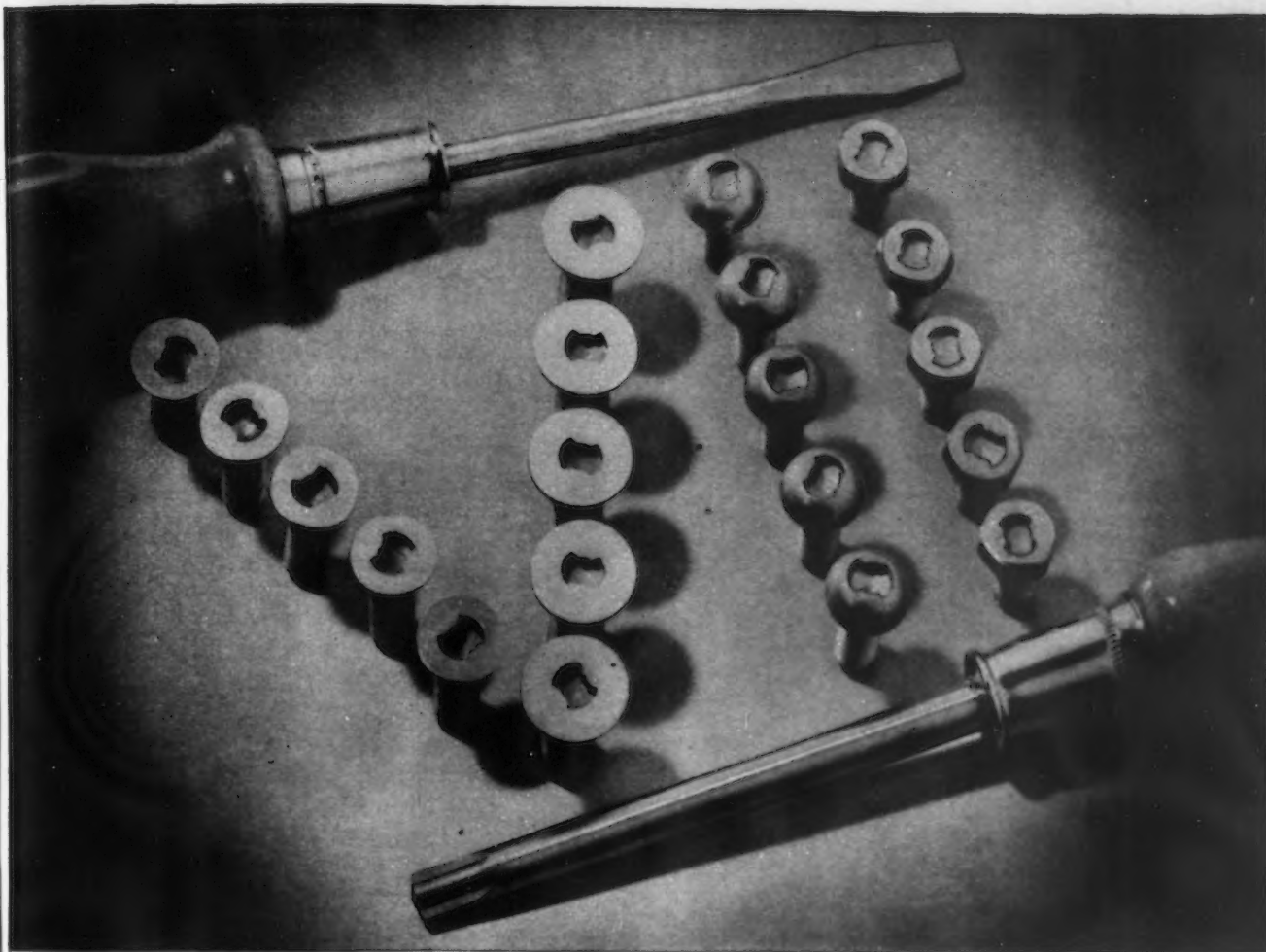
Great reductions in price of magnesium alloy castings have taken place since the war, Mr. Moll indicated, due to elimination of wartime inspection and qualification for special uses by the armed forces.

Speaking of his own company, he said, "Some eighteen months ago our average price of magnesium alloy castings was \$2.50 per lb. Our price the first of August was \$1.70 per lb... and selling prices are still on the downward grade. In fact, today we have some magnesium alloy castings selling at low as 55¢ per lb.

"When we talk about price, we must not lose sight of the difference in weight between magnesium and other metals and also the fact that it is the easiest of all metals to machine. If these factors are taken into consideration, we find that magnesium alloy castings are generally competitive to other nonferrous metals, and if any great amount of machine work is necessary, they are competitive to ferrous metals."

**National Safety Council
Elects T. F. Smith, Chairman**
Pittsburgh

... Theodore F. Smith, president of Oliver Iron & Steel Corp., Pittsburgh, was elected chairman of the board of directors of the National Safety Council at their recent Chicago meeting. Mr. Smith, who has been very active for the council, will serve for one year.



Seven Major Features

have established
CLUTCH HEAD as
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screw on the market . . . for safer, speedier production and lower final cost.

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- V** The rugged Type "A" Bit delivers a longer uninterrupted spell of service . . . and may be repeatedly reconditioned to original efficiency by a 60-second application of the end surface to a grinding wheel.
- VI** Simplified field service . . . because CLUTCH HEAD is the only modern screw operative with the ordinary type screwdriver, or any flat blade, of proper width.
- VII** Here again the CLUTCH HEAD Lock-On saves the day. With the Type "A" Bit, rusted-in and frozen-in screws may be withdrawn undamaged and held secure against dropping for re-use.

Because CLUTCH HEAD is "The Screw That Sells Itself," we invite you to personally examine and test these features. Your re-



quest will bring you, BY MAIL, a package assortment of CLUTCH HEAD Screws and sample Type "A" Bit; also fully illustrated Brochure.

UNITED SCREW AND BOLT CORPORATION

CHICAGO 8

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NEW YORK 7

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The Armstrong System makes it easy to tool up efficiently

There is a right way to tool up every job—a correct tool of proper size, shape, cutting angle and strength . . . a type of cutter that will be most efficient for the material to be machined, the cutting speed and machining conditions. Comprising (1st) ARMSTRONG TOOL HOLDERS of over 250 sizes and shapes, (2nd) ARMSTRONG HIGH SPEED Bits, Blades and Cutters, (3rd) ARMALLOY Cast Alloy Bits and Blades, and (4th) ARMIDE Carbide-tipped Cutters in both "Red" and "Grey" grades, the Armstrong System reduces the problem of correctly tooling-up for any operation on lathes, planers, slotters or shapers, to the selection of the correct ARMSTRONG TOOL HOLDER and the best suited cutter-bit. In the Armstrong System your tool designing has already been expertly done for you, the new cutting materials and advanced machining methods adopted, the tests made, the "bugs" eliminated, and all engineering costs absorbed. You can buy efficient up-to-the-minute tooling "over the counter" from your local industrial distributor. To tool up this easy way is to tool up the right way. Plan your reconversion or post-war tooling around the Armstrong System of Tool Holders.

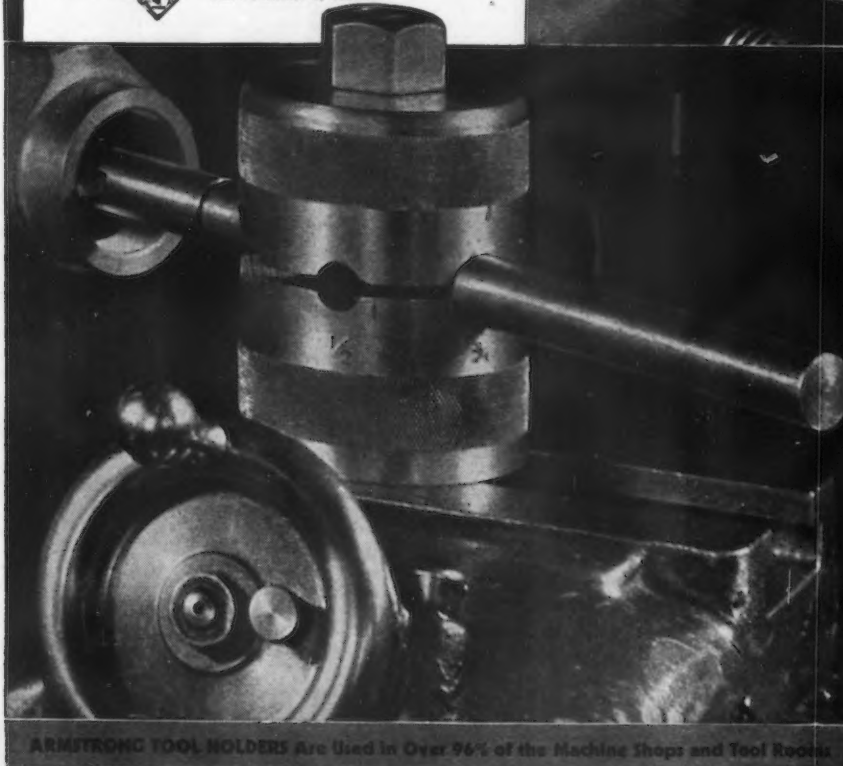
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ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

New Brazil Foundry Highly Mechanized For All Castings

Detroit

• • • The plans for the foundry for the Brazilian National Steel Co. project at Volta Redonda, have been accepted by the company, and construction has commenced, according to Roy I. Jones, head of the Industrial Engineering Division of Giffels & Vallet, Inc., and L. Rossetti, Associated Engineers and Architects of Detroit, who designed the complete foundry project.

The foundry, which will cost approximately \$1,850,000, will produce ingot molds and stools, chilled iron rolls, steel rolls, and miscellaneous iron, steel and nonferrous castings.

Except for the mixer and open-hearth buildings, the steel mill project is housed in reinforced concrete buildings. The foundry building, however, will be of structural steel bought and fabricated in the United States for shipment to Brazil.

The foundry is a dual purpose facility. Half of the space is devoted to highly mechanized production systems for the regular supply of ingot molds and stools. The remaining half of the foundry is primarily for the production of castings to maintain the mill equipment in constant operation, with facilities and equipment capable of producing any casting in the mill including a 30-ton steel roll.

The foundry is designed so that ingot molds may be poured with hot blast furnace metal direct from the openhearth mixers. Its equipment includes a cupola, air furnace, electric furnace, monophase furnace, nonferrous metal furnace, annealing furnaces, pit type ingot mold ovens, a completely mechanized sand conditioning and distribution system, casting and cleaning equipment, roll turning lathes, and ingot mold milling equipment. The equipment was especially selected by the engineer-architects to provide continuous operation and low maintenance costs. Although several steel mills in the United States are served by larger foundries, none is more complete nor capable of producing a wider range of castings. There is no other plant in South America at present where large rolls and ingot molds are produced.

The "jobbing" nature of this foundry's operations requires that it be, in addition to an ingot mold foundry, a steel foundry one week, an iron

foundry the next and perhaps a roll foundry the following week. This gave rise to the requirement that, in addition to the charging of the cupola, the arc furnace and air furnace would need to be charged at various times both with cold charges and with hot charges for duplexing.

Special charging devices for each type of melting units were decided against for reasons of economy. Instead, an efficient and economical layout was designed by which the cupola, arc furnace and air furnace could be cold charged, and with the same charging crane, the air furnace and arc furnace could be charged with hot metal for duplexing.

The layout was arranged in such a manner that crane coverage was provided for the entire building area. By an ingenious device, provision was also made for present and future stacks for melting units and other equipment within the building area. The cranes in the storage bay were located for the handling of the scrap, the preparation of the charges, the placing of the charges in the melting unit as well as for the servicing of the melting units.

Cites Need of Safety Program in Industry To Reduce Accidents

Cleveland

• • • Since 1915 the accident rate in the production of steel, measured by the number of accidents to each million man-hr worked, has been reduced by approximately 90 pct, C. R. Cox, president of the National Tube Co., Pittsburgh, told the Cleveland Safety Council recently.

"Those engaged in safety work," said Mr. Cox, "estimate that about 80 pct of this reduction in accidents can be directly attributed to the development of safety practices on the part of workers which has resulted from the educational phase of the program."

Mr. Cox, who is president of the Western Pennsylvania Safety Council, pointed out that many years ago the steel industry recognized that something must be done to eliminate accidents, and in 1912 the Association of Iron & Steel Engineers set up a committee with the objective of organizing and guiding a permanent body devoted to the preservation of human life in the industry. It appeared at that time that the machinery of production was the principal



LOOKING AHEAD!

OUT OF WAR-PRODUCTION experience have come new production and control ideas. Many of them are readily adaptable to peace-production problems.

A GREAT MANY of these new developments in the general fields of weighing, testing, force-measuring, balancing, counting and batch-control can be seen in their war-applications, in the new booklet "Background for Victory".

THIS IS NOT A POSTWAR CATALOG. It is an idea book for idea men looking for new ways to get better and faster results in these fields.

A COPY WILL BE SENT to any industrial executive, without charge, and without sales solicitation of any kind.

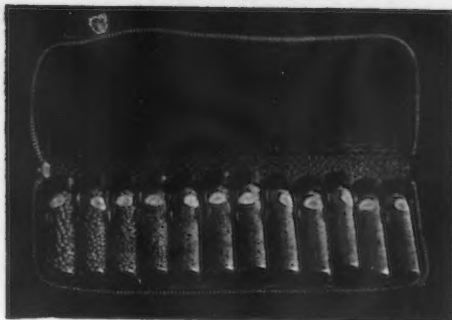
Toledo Scale Company, Toledo 12, Ohio.



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We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

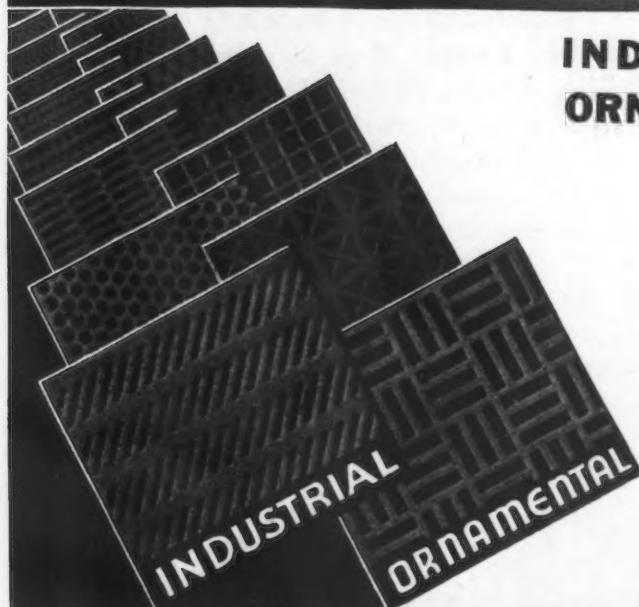
has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.



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NEWS OF INDUSTRY

cause of the accidents in the industry, and the first aim of this organization was the development of adequate mechanical safeguards for the protection of workers.

Results of this effort, he revealed, were soon apparent in the reduction in the accident toll, but it was early observed that a major proportion of deaths and injuries could be attributed directly to the carelessness of some worker, which led to the development of the educational phase of the program wherein employees were educated in accident prevention on the job as a part of the safety movement.

"In tackling this problem of safety and the prevention of accidents in our plants, we have proceeded along the line that there must be definite recognition of some well-defined principles and that there cannot result improvement in safety except as these principles are diligently and faithfully applied day in and day out," Mr. Cox said.

According to Mr. Cox, the following principles must be followed for safety to improve: A definite recognition on the part of top management that safety is a "must" and that it takes precedence over production; safety must be translated into effective action by all segments of line operating authority; safety consciousness and the need for full cooperation must be fully developed in all ranks of personnel; line operating authority must be adequately supported by a safety service organization which is responsible for the development of suitable safety programs and the servicing of line authority in all respects; and that the responsibility for safety performance is that of the operating management from top to bottom.

That National Tube applied these principles in the year 1944 with some degree of success is evidenced by the fact that there were 2.11 accidents per million man-hr worked for the year as compared with 2.4 accidents per million man-hr worked for the year 1943, or a decrease of approximately 12 pct.

Emphasizing the failure of all types of industry to attain a degree of proficiency in safety comparable to their production accomplishments, Mr. Cox cited industry-wide figures on the number of accidents for each million man-hr worked which show that there were 12.52 accidents in the year 1940; 15.39 for the year 1941; 14.85 for the year 1942; 14.52 for the year 1943; and 14.47 for the year 1944.

Discusses Special War Problems Faced By British Steel Co.s

New York

• • • In a resume of the contributions of the British iron and steel industry to the war effort, *Metallurgia* emphasizes that at the outbreak of war, Britain was very inadequately prepared.

Further, "In changing from peace to war, many problems were almost immediately encountered. The deposits of rich iron ore in this country had become practically exhausted and for many years rich iron ores had been imported from abroad to mix with leaner home ores. With the increased intensity of submarine warfare, available shipping was used for other purposes and imports of rich ore dwindled until it reached a negligible tonnage and the lean home ores had to be used almost exclusively.

"In countries like Britain, where the industry has flourished for centuries, the richer haematite home ores are almost exhausted. In countries like America, which have great deposits of rich ores available, the same problems are not encountered. In that country no difficulty is experienced in obtaining uniform supplies of ore with an average iron content of 50 pct. Britain's iron ores by comparison are lean and do not exceed an average iron content of 30 pct, indeed the bulk ranges from about 19 to 27 pct, and supplies are not by any means uniform, either in composition or in particle size, thus, beneficiation is usually carried out to concentrate the home ores, and mixing and grading is generally necessary to assist the production of an iron of uniform quality.

"In addition to the enforced use of lean home ores, involving the handling and transporting of larger tonnages and the charging of burdens, which gave less returns from the blast furnace, fuel is considerably increased in price and more is necessary per ton of iron produced than under normal peace conditions. Since the crude iron from the blast furnace supplies the main tonnage for steelmaking, the effect of these difficulties must be to increase the cost of manufacturing steel. In the steel plants difficulties have also been encountered in providing suitable alloying elements or in substituting available alloys necessitating changes in practice. It soon became essential to make the best use of the tonnages of alloying elements

OUT OUR WAY



A SAFE, SURE FOUNDATION for economy in any industrial plant . . . floors that are free from dangerous oil- and grease-deposits! And SPEEDI-DRI . . . the oil-thirsty absorbent . . . is just what the doctor ordered for slick, sick surfaces . . . to cut down on falling accidents that mean lost productive time . . . soaring insurance-rates . . . costly hospital-bills.

SPEEDI-DRI is a *natural* because it works while you work . . . in safety! A white, granular substance, it imparts a bright *seeability* to industrial plants . . . while soaking-up grease-and-oil deposits. No expensive machinery is needed to apply SPEEDI-DRI . . . no trained personnel. Just spread it out over offending surfaces . . . and immediately, you've got a carpet of safety underfoot . . . safe for working, safe for walking. Sweep it up, and floors are whistle-clean.

Yes, it's economy-wise to use SPEEDI-DRI! First, it cuts down on costly accidents . . . second, it releases man-power for more productive jobs . . . third, it helps preserve all types of floors . . . cement, wood, or composition.

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Obsoletes Riveted, Bolted, Soldered Construction

GALV-WELD PROCESS (Patented)

The weld and adjacent damaged area, where the galvanizing burns away at the time of welding, are coated while welding, using the residual heat to flow on Galv-Weld Alloy, permanently insuring

100% PROTECTION AGAINST RUST AND CORROSION

Galv-Welding obsoletes riveted, bolted, soldered construction; lowers costs; makes for stronger, leakproof, vibrationless construction. It produces no fumes, requires no sand or grit blasting, flux, special equipment, set-up or clean up after application. The alloy, in bar form, is quickly applied in all positions and confined quarters. The coating eliminates painting expense: will not chip, peel or crack, even when the base metal is stressed beyond its elastic limit. Fractures in galvanizing, due to forming, are easily coated.

Government approved, with tests showing Galv-Weld equal to and/or better than hot dip galvanizing in corrosion resistance, not only passing standard salt spray requirements of 200 hours, about 8 days, but remaining in test 141 days. Galv-Welded joints have withstood over 8 years' exposure to salt air mists. The process is a must for underground storage tanks. All-welded steel buildings are now practical.

RAILROADS employ it in construction and repair of water tanks, signaling systems, towers and piping.

SHEET METAL WORKERS use it in air conditioning duct systems. It is also especially applicable in refrigerator units.

REFINERIES like it because it is not affected by the corrosive acid-bearing fumes.

ELECTRIC POWER COMPANIES are redesigning transmission towers to utilize welded rather than bolted type construction. It is used also in the repair of sub-station galvanizing and transformer cases.

SHIPBUILDERS are coating welded seams and joints in pipe, sheets, plates, ventilation ducts, deck houses, water and fuel tanks, sanitary drains, ammunition and ready-service boxes, gallery and baking equipment, sinks and washers, cold storage lockers, inner bottoms and hand rails.

You are invited without cost to submit products for producing examples of Galv-Welding. Further details and sample of Galv-Weld Alloy may be had by writing

GALV-WELD PRODUCTS
Dayton 10, Ohio

available and to apply the alloys as effectively as possible.

"In Britain we had all the coal we required, we could use leaner iron ore, and 15 pct of our requirements of ferro-silicon from home sources. All the remaining requirements had to be shipped from abroad. Thus, for instance, 93 pct of manganese ore, 65 pct of chrome ore, 87 pct of nickel and 63 pct of tungsten were from Empire sources and were available to us, providing we could ship from the countries supplying them. On the other hand, we lost about 20 pct of our chrome ore from Greece; 32 pct of magnesite which also came from Greece; 89 pct of our ferro-chrome from Norway and Sweden. We also lost about 57 pct of our ferro-silicon, 71 pct of our titanium ore, and also 22 pct of tungsten, which came from China. Supplies of these materials that were available had to be controlled, but under the severe conditions then prevailing for cargo ships, supplies could not be maintained regularly. Considerable modifications in steel manufacture, therefore, were necessary and specifications were substantially reduced.

"Considering that steel furnaces have been worked regularly beyond their normal capacity, under black-out conditions and with frequent alerts and these are considered in relation to the success achieved, the British iron and steel industry has given a good account of itself. While the normal production of British steel plants before the war was between 10 and 11 million tons, it is probable that production during the peak year, 1943, will be nearer 14 million tons."

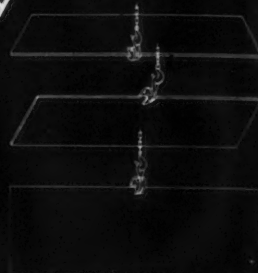
In addition to the manufacture of the "run-of-the-mine" weapons necessary, attention is called to several outstanding structures such as "the Bailey Bridge, the Tank and Scissor Bridges, which served our Forces so admirably, especially in Italy, where the terrain is difficult; the colossal task of planning and constructing a prefabricated floating harbor, big enough to supply the Allied Armies in France. Huge concrete caissons, each weighing 7,000 tons, were towed across the 100 miles of channel to the Normandy coast, where 15 obsolete ships had been sunk to form a preliminary harbor. Floating piers and pierheads were made in sections and towed across the sea. These structures enabled the Allied Armies' demands for supplies to be met.

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(a Merrill Product)

Picks up any
flat surface object

Safely — Rapidly
Easily



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Lead Time Estimates Issued; Will Aid In Production Schedules

Washington

• • • The WPB has issued a pamphlet showing the approximate lead time—the time lapse between the date of receipt of an order and the shipping date—for procurement of nearly 600 standard components in a number of manufacturing industries. Comparison is made of the average normal prewar time lag, the present time lag and the estimated date when the time lag is expected to return to normal.

The pamphlet is designed as a measure of guidance to users in scheduling production as well as government priority officials and is based on information furnished by WPB industry division. It was explained that the information will be particularly valuable to new manufacturers seeking components and substitute materials. It will also indicate to government priority officials whether or not a need actually exists for priority assistance. It is not expected, WPB said, that priority ratings will be issued in order to anticipate reasonable lead times. Since WPB will be dissolved on Nov. 1, the priority system now greatly reduced in scope will be operated by the Civilian Production Administration.

The WPB pamphlet points out that the time lags or lead times shown are average and that conditions in specific localities or for special quantities, or particular specifications, would obviously vary. It was added that the present day time lag may vary from week to week, depending on stock inventories of raw materials, components and transportation.

For steel, the pamphlet says that lead time is 30 days prior to the first day of the month of rolling. Deliveries vary from four to 30 weeks depending on the item, quantities, locality and mill schedules. No generalization, it is pointed out, can be made since this is a period of order book readjustment.

For copper the prewar and present lead time for alloy ingots and refined copper is given as four weeks with no estimate for normal lead time in 1946. For brass mill products, the prewar lead time is given as four weeks, the present lead time as 13 weeks and August 1946 is estimated as the date of normal lead time. For copper foundry products, comparative lead times are

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NEWS OF INDUSTRY

two weeks, four weeks and February; while for copper wire mill time leads are six weeks, eight weeks and August.

Lag times for items in the construction machinery, general industrial equipment and tools group follow:

	Prewar Lead Time (weeks)	Present Lead Time (weeks)	Lead Time to be Normal (estimated)
CONSTRUCTION MACHINERY			1946
Conveyors, construction material, portable belt type and for portable plants*	4-8	4-8	—
Cranes, attachments for tractor mounting	2-4	12	Oct.
Cranes and shovels, dragline, power**	4-8	12-36	Oct.
Drilling machines, portable, water well and blast hole drills, churn drill type...	2-4	26	Oct.
Holists, contractors and material handling, hand held and power driven types...	2-4	2-4	—

* Usually made to buyers' specifications.
** Shortest delivery on smallest machines.

	Prewar Lead Time (weeks)	Present Lead Time (weeks)	Lead Time to be Normal (estimated)
GENERAL INDUSTRIAL EQUIPMENT			1946
Compressors—			
Large type.....	4-32	12-40	Feb.
Conveyors and conveying systems.....	12-20	16-24	July
Fans and blowers—			
heavy duty type.....	10-20	10-20	—
Motors and generators, 200-500 hp.....	20-30	20-40	March
Motors and generators, over 500 hp.....	20-50	26-52	March
Ovens, industrial type.....	4-20	4-20	—
Welding equipment, electric (std).....	Stock-15	5-16	March
Welding equipment, acetylene.....	Stock	Stock-15	March
Welding electrodes.....	Stock	Stock	—
Wireworking machinery.....	4-20	12-20	Feb.
TOOLS			
Anti-friction bearings.....	1-8	4-8	Feb.
Cranes.....	6-12	6-12	—
Lathe chucks.....	3	3	Dec.
Die casting machines.....	12	12-52	—
Foundry supplies.....	1-12	1-12	—
General machine tools.....	1-12	4-52	1947
Holists.....	1-3	1-3	—
Hydraulic forming presses (large).....	52	64	1947
Hydraulic forming presses (average).....	12-24	24-36	Oct.
Jigs and fixtures.....	1-12	1-12	—
Presses, mechanical.....	12	6-24	Oct.
Shears and brakes, power.....	12	24-52	1947
Tools, portable elec. and pneumatic.....	2	2-16	June
Tools, light power driven.....	1	1-16	June

Institute Chapters Elect

New Haven, Conn.

... All officers and members of the executive committee of the Southern New England Chapter of the Institute of Scrap Iron & Steel, Inc., were re-elected at a meeting held on Sept. 25.

Joseph A. Schiavone of M. Schiavone & Sons, Inc., New Haven, was re-elected president.

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Contractors Delaying Termination Progress

Chicago

• • • Delay by contractors in filing claims and inventories is holding up settlement of termination cases in the Chicago Ordnance District, Col. John Slezak, district chief, indicated last week.

"On our 975 remaining cases, we have received only 602 inventories and 487 claims from contractors," he said. "Settlement negotiations cannot even be started until inventories and claims are submitted. In the general interest I urge that companies go full speed ahead in completing this work so that they may soon become free to devote their entire energies to peacetime production."

The 975 cases remaining on Oct. 15 involved approximately one billion dollars in cancelled production. Of these cases, 51 were over four months old with an additional 37 pending between three and four months. The district has set a goal of settling at least 97 pct of its cases by Dec. 31 and is making satisfactory progress toward that goal, Col. Slezak said.

In September the district settled 295 cases, topping July, the previous high month for settlements, by 111 cases. However, it was pointed out that nearly 50 pct of the September settlements were "no charge" cases settled at no cost to the government

New Recommendation Proposed by Bureau

Washington

• • • A proposed Simplified Practice Recommendation for hard edge, flexible back, metal cutting band saws has been submitted to producers, distributors, and users, for acceptance or comment, according to an announcement of the Div. of Simplified Practice of the National Bureau of Standards.

The proposed recommendation, which was developed in cooperation with the industry contemplates the establishment of a voluntary simplified list of regular type and skip-tooth type of hard edge, flexible back, metal cutting band saws. It is believed that the proposal will meet all regular requirements.

Mimeograph copies of the proposed recommendation may be obtained from the Div. of Simplified Practice, National Bureau of Standards, Washington 25, D. C.

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